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Cyclical properties in the main western economies.

By

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Abstract

This paper analyses the cyclical properties in the main western economies (G-7 countries, Spain and Switzerland). Using the contemporary or maximum cross-correlation with the GDP could mask or find similarities among countries when they do not exist, we focus on the structure of a wide set of cross-correlations. The results show a great similarity in the cyclical behaviour of the variables, showing common business cycle phenomena among the analysed countries. The highest differences were found in the behaviour of the monetary variables and in the real wage, what seems to indicate a different role of the monetary policy and differences in the national labour markets. Additionally, we use three alternative filter methods (HP, BK and First Difference), and in contrast to the work of Canova (1998), the results do not change, at least qualitatively, with the filter method. Moreover, we study the temporal stability of the cyclical facts. This analysis shows that in general the relationship of the different variables with the GDP cycle is fundamentally stable over time, while volatilities are not so stable, indicating that the same economic mechanisms are present in periods of high and low volatility.

Keywords: cyclical stylised facts, correlation structure, alternative filter method, temporal stability.

JEL classification: E32, E00

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1. Introduction

The main goal of this paper is to provide a comparison of the cyclical characteristics of the most important western economies, G-7 economies plus Spain and Switzerland. The research in this field has a long history (see the works of Burns and Mitchell inside the NBER), but the interest in this area has been revitalised by the work of Lucas (1972), who states that the business cycle is a similar phenomena along time and among countries. The development of the real business cycle models (RBC) has also contributed to the fact that in recent years a lot of work has been devoted to characterising the cyclical properties of economies, providing a set of regularities or stylised facts which macroeconomists use as a benchmark to examine the validity of numerical versions of their theoretical models.

Following this area of research, this paper re-examines this topic pursuing three related goals. Firstly, and most importantly, to modify the criteria by which we consider the cyclical behaviour of the variables to be similar or dissimilar among countries, because the habitual criteria can find cyclical similarities when they do not exist and in other cases can mask them. Secondly, to study if cyclical properties are robust to the filtering method. This subject is related to the paper of Canova (1998) which finds that the cyclical facts change with the filter used. Instead we find that with the three filters used here, Hoodrick and Prescott (1980), Baxter and King (1995) and first difference, they do not change, at least qualitatively. Finally, the paper also studies if the stylised facts are stable along time by means of calculating recursive statistics.

2. Methodology

The methodology used is similar to the majority of papers in this area, with only one exception: the criteria to characterise stylised facts and to establish similarities among countries is enlarged. We not only consider the contemporary and/or the maximum correlations but also a set of correlations including leads and lags. The structure of this set of correlations will be shown in graphic form, which allows a better comparison among variables and countries. This change, as will be seen when the results are

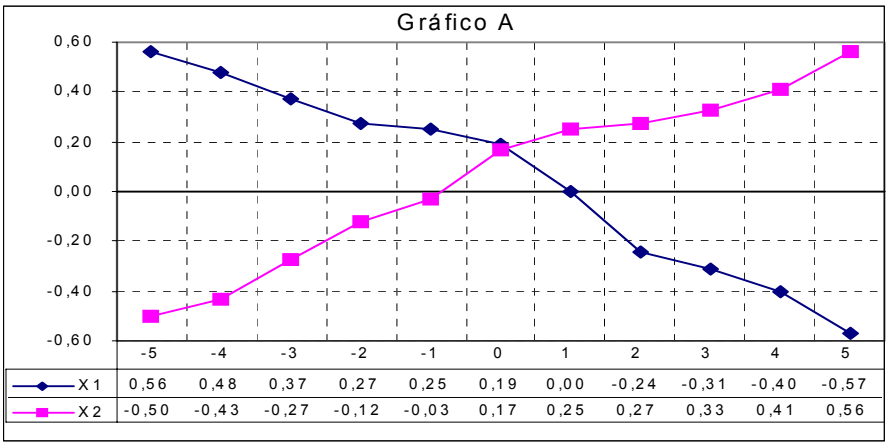
presented, leads in certain variables, to drastic changes in the similarities of the cyclical behaviour among economies.

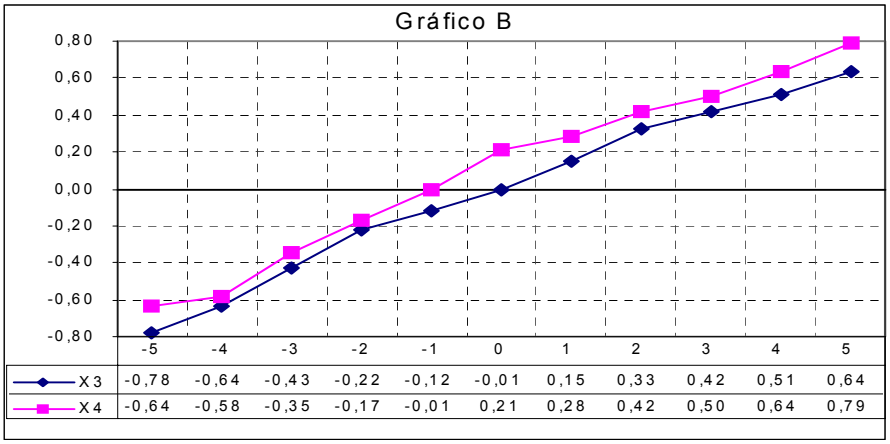
Before analysing the cyclical characteristics of the different economies we need to define what the cycle is. We follow the common practice of decomposing a time series into secular and cyclical components using the filter of Hoodrick and Prescott (1980). Additionally, as we want to analyse if the stylised facts change with the filter used, we also use the Baxter and King (1995) and first difference filters.

After the cyclical components of each series are obtained we calculate their cyclical properties. The usual procedure is to study the volatility, the persistence and the degree of association with the GDP cycle, for every series. Volatility is studied calculating the standard deviation relative to the GDP, persistence is measured by the first order autocorrelation coefficient, and the degree of association with the GDP cycle is quantified by the contemporary and/or the maximum correlation coefficient. The first characteristic, volatility, informs us about the relative volatilities of variables; the second indicates the degree of inertia in cyclical deviations; and the third provides information about whether a series is procyclical or countercyclical and whether a series has a phase shift relative to the GDP cycle.

To classify a series as procyclical or countercyclical and lagging or leading relative to the GDP, two strategies have been used. According to the first one, a series (Y_t) would be called procyclical if the contemporary correlation with the GDP cycle is positive and countercyclical if it is negative. Additionally Y_t would be lagged if the maximum (in absolute value) correlation is reached between GDP_t and Y_{t+i}. Alternatively if the maximum correlation is reached between GDP_t and Y_{t-i}, then series Y_t leads the GDP cycle by i periods. The second strategy is very similar to the first one; the only difference being that a series would be called procyclical if the maximum correlation (in absolute value) is positive and it would be countercyclical if the maximum correlation is negative.

Both strategies work well to discover cyclical similarities among countries when the set of correlations have a well defined maximum but in some cases they can mask the possible similarities or dissimilarities. For example, in Graphs A and B, we can see two situations in which the habitual criteria do not work well. In Graphs A and B we can see the correlations between GDP_t and some hypothetical series X_t, and in particular we can see the correlations between GDP_t and X_{t-i} (for i = 1, ... ,5).





Graphic A shows that the cyclical behaviour of X1 and X2 are extremely different but the first strategy would classify both X1 and X2 as slightly procyclical and lagged. Graph B shows that X3 and X4 have similar behaviour with the GDP cycle, but the second strategy would classify X3 is leading and countercyclical, whereas X4 would be lagging and procyclical.

These examples highlight the convenience of modifying the criteria to classify and compare the cyclical behaviour of different variables among countries. Ideally, we will would construct an index that summarises the set of correlations but the negative and positive ones would cancel out, and then we would have the same problem when using the contemporary correlation. However, we will present the set of correlations in graphic form, and depending on the shape of the graph, we will consider if the cyclical behaviour of a variable is similar or not in different countries. This procedure is not statistically based, but in our opinion is preferable to using the habitual criteria that can potentially lead us to erroneous conclusions.

3. Empirical Analysis.

The empirical analysis is carried out for nine economies (G-7 economies plus Spain and Switzerland). For every economy we studied a large set of variables grouped in four categories: components of spending, monetary variables, labour market variables and external variables. A detailed analysis of the sources and definitions of the series are in appendix1, but in the following table we list the variables that we analyse. The data are quarterly seasonally adjusted and the sample size comes from 1970:2 to 1994:1. All variables are measured in natural logarithms except net exports and inventory investment, which are expressed as a percentage of GDP.

ANALISED VARIABLES

Components of spending	***Monetary variables***
1) Gross Domestic Product (GDP)	10) Nominal Money (M)
2) Private Final Consumption (C)	11) GDP Deflator (DEF)
3) Government Final Consumption (G)	12) Inflation (INF)
4) Gross Fixed Capital Formation (FBK)	13) Nominal Rate (In)
5) Exports of Goods and Services (X)	14) Velocity of Money (V)
6) Imports of Goods and Services (M)	15) Real Money (MR)
7) Net Exports (XN)	***Labour market***
8) Increase in Stocks (STO)	16) Employment (L)
9) Industrial Production (IPI)	17) Productivity (PRO)
	18) Nominal Wage (Wn)
	19) Real Wage (Wr)
	External Variables
	20) Exchange Rate (TC)
	21) Terms of Trade (TOT)

The cyclical component of each series was obtained using the three filter methods mentioned in the previous section: HP ($\lambda = 1600$), BK and first differences. Afterwards, we calculate for each country and all variables (X_t) the correlation coefficients between GDP_t and $X_{t \pm i}$, for $i = \{0, 1, \ldots, 5\}$. That is, we consider a temporal window of two years and three quarters, that we consider long enough to capture the cyclical dynamics of the different variables, since the cycles obtained with HP and BK filters have typically this duration; but when we use the first difference filter we reduce the correlation window to $i = \{0, 1, 2\}$, because the first difference cycles are of less duration whit this filter. To classify and compare the different variables among countries, we pay attention to the complete set of correlations, although in many variables, mainly in real variables, it would be sufficient to look at the maximum correlation because the structure of their correlations has a maximum well defined and around this maximum the correlation with GDP falls for both sides of the correlation window.

In the literature it is habitual to use HP filter to obtain the stylised facts, then to facilitate the comparison with other papers, except when otherwise expressly stated, the results refer to the statistics calculated with HP filter. The results are very similar for HP and BK filters, while when we filter out by first difference, results change quantitatively but they do not change qualitatively. Then we will only refer to the results obtained with BK and first difference filters when it was considered necessary to clarify or to extend some aspects of the results. A detailed analysis of the robustness of stylised facts to the filter method will be carried out in the fourth section of the paper.

3.1) Stylised facts

Results will be presented grouping the variables in the four categories previously mentioned: components of spending, monetary, labour market and external variables. To facilitate the reading of the results, we will present the results about correlations in two ways: firstly we will present a summary of the results in a table, and the complete set of correlations will be showed in graphic format.

For each of the four categories two tables will be presented. The first table will contain the maximum correlations of each variable with the GDP, and a number that indicates when this maximum is reached. Therefore, that number will indicate to us if the cycle of that variable leads o lags the GDP cycle. For example, a 3 would indicate that

this variable lags the GDP cycle by three-quarters, while a –4 would show the variable leads by four quarters the GDP cycle. The second table will present the volatility (relative to GDP) of each variable for all the countries. The graphs of this section will contain the set of crossed correlations of each variable with the GDP for every country.

Also in the description of the results we will use the adjectives strong if the maximum correlation (in absolute value) is bigger than 0.5, weak if it is between 0.2 and 0.5, and acyclical if it is under 0.2.

3.1.1) Components of Spending

As we can see in Table 1 and in Graph 1, in all nine countries, private consumption is strongly procyclical and coincident with the GDP cycle; only in France and the USA consumption lead GDP by one quarter. The volatility of consumption (see Table 2) is below one, except for Spain and the United Kingdom, where consumption is more volatile than the output. The results for these two countries contradict the consumption smoothness predicted by the Permanent Income/Life Cycle theory, could simply reflect that consumption has not been purged of consumer durable purchases. Unfortunately, such a decomposition is not available on a quarterly basis for all the countries, and also it would be more appropriate to have series of consumption of durables measured in term of the services of these goods. Backus et al. (1993) find that the volatility of consumption is lower if expenditure on durables are excluded. Blackburn and Ravn (1992) obtain the same result for the UK; but Estrada and Sebastian (1993) find, for Spain and with annual data, that after excluding the expenditure in durable goods, the consumption continues presenting excess volatility. Cristodoulakis et al. (1995) also find excess of volatility (with annual data) for Denmark, Germany, Belgium, Ireland, Holland, Portugal, as well as Spain, the UK, and the OECD. These results indicate that to find excess of volatility in private consumption is not so puzzling and that it is not exclusively due to the non-differentiation between durables and non-durables. This excess volatility contrary to the hypothesis of smoothing consumption can be explained according to the RBC theories by a large elasticity of intertemporal substitution together with strong wealth effects. A more Keynesian explanation would point out the effects of liquidity constraints and of frequent changes in tax and transfer schemes.

***Table 2**: Components of spending (maximum correlations with GDP)*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
C	0.84 0	0.73 -1	0.83 0	0.89 -1	0.81 0	0.77 0	0.86 0	0.85 0	0.79 0
FBK	0.86 0	0.85 0	0.71 0	0.94 0	0.78 0	0.88 0	0.62 0	0.93 0	0.83 0
G	0.49 1	-0.38 3	-0.37 -3	0.42 5	0.42 -5	0.49 5	-0.31 -5	-0.53 4	0.36 -1
X	-0.32 5	0.60 0	0.45 0	-0.60 -5	0.32 -1	0.61 1	0.69 0	0.23 5	0.71 -1
M	0.67 -1	0.81 0	0.71 0	0.80 0	0.76 0	0.88 0	0.81 0	0.64 2	0.85 -1
XN	-0.51 0	-0.42 0	-0.49 1	-0.62 -3	-0.49 1	-0.50 -4	-0.34 1	-0.56 1	-0.51 -1
STO	0.30 1	0.58 0	0.58 0	0.61 0	0.71 0	0.46 -1	0.59 0	0.43 3	0.62 0
IPI	0.79 -1	0.87 0	0.90 0	0.92 0	0.89 0	0.83 0	0.86 0	0.83 1	0.79 0

* HP filter (1970:2-1993:4). For each variable the first row contains the maximum (in absolute value) correlation with the GDP. The number in the second row shows when the maximum correlation is reached; for example, a four would indicate that the maximum correlation is between GDP_t and X_{t-4}, then the variable X leads four quarters the GDP cycle.

***Table 3:** Components of spending (relative volatility)*.*

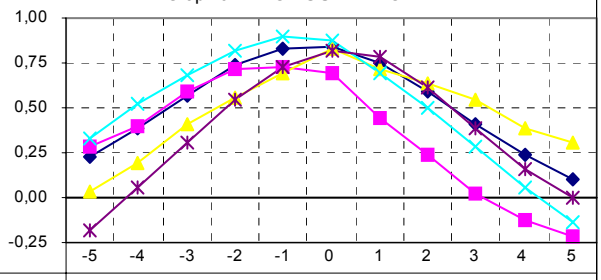
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
GDP	1.22	1.08	1.78	1.84	1.53	1.53	1.60	1.48	1.85
C	1.05	0.83	1.14	0.80	0.86	0.83	0.85	0.98	0.71
FBK	3.74	2.90	2.35	2.82	2.38	2.58	2.75	2.35	2.43
G	0.90	0.69	0.60	0.45	0.32	0.70	0.77	0.92	0.66
X	2.63	2.82	1.73	2.50	2.54	2.33	2.73	3.03	1.67
M	3.95	3.72	2.47	3.17	3.13	2.05	3.21	4.13	2.47
STO	0.27	0.69	0.45	0.26	0.56	0.38	0.43	0.27	0.65
XN	0.87	0.72	0.47	0.27	0.53	0.50	0.58	0.43	0.60
IPI	2.18	2.19	1.70	1.95	2.34	2.09	2.47	2.85	1.83

* HP filter (1970:2-1993:4). The variability for GDP's is absolute (in percentage); for the other variables are relatives to the GDP´s volatility.

When BK filter is used, the correlations of consumption with GDP increase slightly and consumption becomes leading in five countries. If first differences are used, consumption is again coincident with GDP cycle. These results suggest, knowing the properties of the filters, that the fluctuations in the high frequencies of consumption are lagged regarding those of the output, since BK filter, contrary to the HP and first difference, eliminate completely the high frequencies.

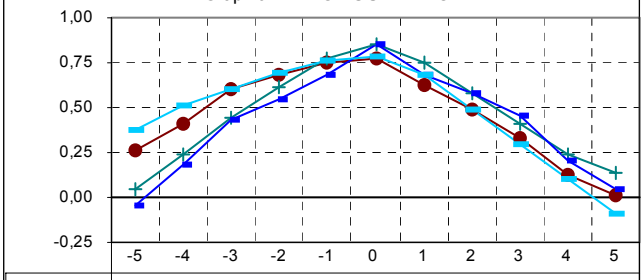
REAL VARIABLES

Graphic 1: **CONSUMPTION**



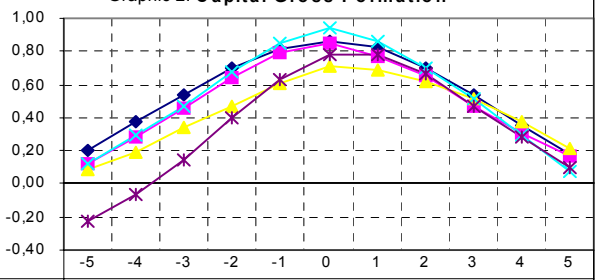
	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	0,22	0,39	0,57	0,73	0,83	0,84	0,75	0,60	0,41	0,23	0,11
FRA	0,29	0,40	0,59	0,71	0,73	0,69	0,45	0,24	0,02	-0,12	-0,21
UK	0,04	0,19	0,41	0,56	0,70	0,83	0,72	0,63	0,54	0,39	0,31
USA	0,33	0,52	0,68	0,81	0,89	0,88	0,69	0,50	0,28	0,05	-0,14
ITA	-0,18	0,05	0,31	0,55	0,72	0,81	0,78	0,62	0,39	0,16	0,00

Graphic 1: **CONSUMPTION**



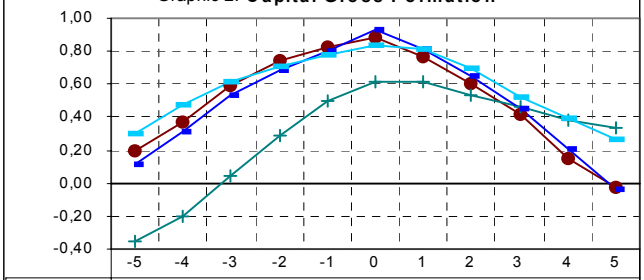
	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	0,26	0,41	0,61	0,68	0,75	0,77	0,62	0,49	0,33	0,12	0,01
CAN	0,05	0,24	0,45	0,62	0,78	0,86	0,75	0,58	0,40	0,24	0,14
JPN	-0,04	0,18	0,43	0,55	0,68	0,85	0,68	0,58	0,45	0,20	0,04
SUI	0,37	0,51	0,61	0,69	0,76	0,79	0,68	0,49	0,29	0,11	-0,09

Graphic 2: **Capital Gross Formation**



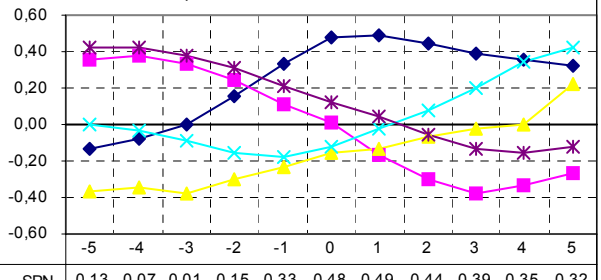
	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	0,21	0,38	0,54	0,70	0,81	0,86	0,82	0,70	0,54	0,35	0,18
FRA	0,12	0,28	0,46	0,65	0,79	0,85	0,77	0,65	0,47	0,31	0,16
UK	0,09	0,19	0,34	0,47	0,60	0,71	0,69	0,62	0,51	0,37	0,21
USA	0,12	0,29	0,47	0,68	0,85	0,94	0,86	0,70	0,51	0,30	0,07
ITA	-0,23	-0,06	0,15	0,40	0,63	0,78	0,78	0,66	0,47	0,28	0,10

Graphic 2: **Capital Gross Formation**



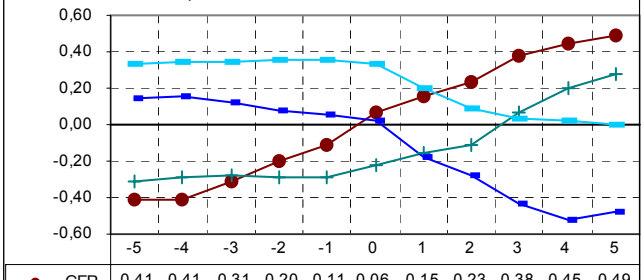
	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	0,20	0,37	0,59	0,74	0,83	0,88	0,77	0,60	0,41	0,15	-0,03
CAN	-0,36	-0,20	0,05	0,28	0,49	0,62	0,61	0,53	0,46	0,38	0,34
JPN	0,11	0,31	0,53	0,69	0,80	0,93	0,82	0,66	0,45	0,21	-0,04
SUI	0,30	0,48	0,61	0,70	0,78	0,83	0,81	0,70	0,53	0,39	0,26

Graphic 3: **PUBLIC CONSUMPTION**



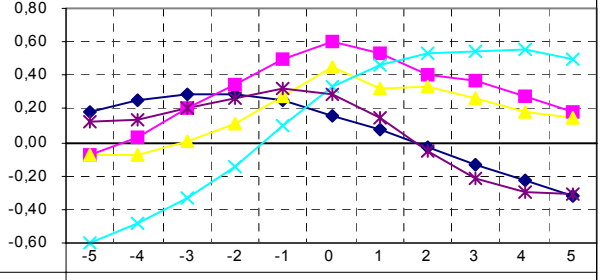
	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	-0,13	-0,07	0,01	0,15	0,33	0,48	0,49	0,44	0,39	0,35	0,32
FRA	0,35	0,37	0,34	0,25	0,11	0,02	-0,17	-0,30	-0,38	-0,34	-0,26
UK	-0,37	-0,35	-0,37	-0,30	-0,23	-0,15	-0,13	-0,07	-0,02	0,00	0,22
USA	0,00	-0,03	-0,08	-0,16	-0,18	-0,12	-0,02	0,07	0,20	0,35	0,42
ITA	0,42	0,42	0,38	0,31	0,21	0,12	0,05	-0,06	-0,13	-0,15	-0,13

Graphic 3: **PUBLIC CONSUMPTION**



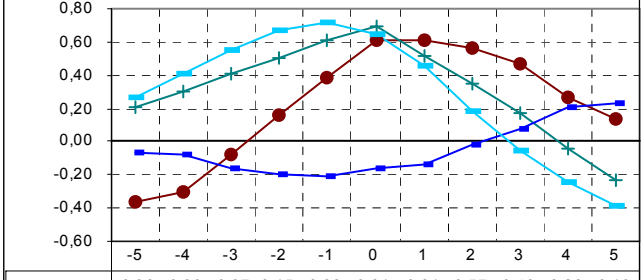
	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	-0,41	-0,41	-0,31	-0,20	-0,11	0,06	0,15	0,23	0,38	0,45	0,49
CAN	-0,31	-0,29	-0,28	-0,29	-0,29	-0,22	-0,16	-0,11	0,06	0,20	0,27
JPN	0,15	0,15	0,12	0,08	0,06	0,02	-0,18	-0,28	-0,44	-0,53	-0,47
SUI	0,33	0,35	0,34	0,36	0,36	0,33	0,20	0,09	0,03	0,03	0,00

Graphic 4: **EXPORTS**



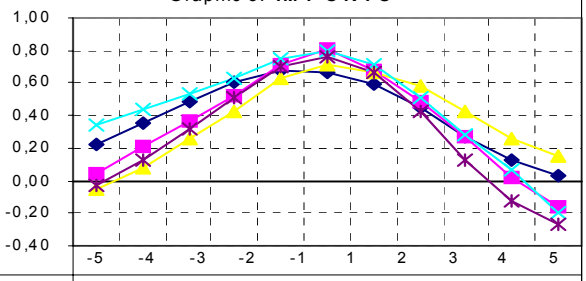
	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	0,18	0,25	0,29	0,29	0,25	0,16	0,08	-0,03	-0,13	-0,23	-0,32
FRA	-0,07	0,03	0,20	0,34	0,50	0,60	0,53	0,40	0,37	0,28	0,18
UK	-0,07	-0,07	0,01	0,12	0,27	0,45	0,32	0,34	0,26	0,18	0,14
USA	-0,60	-0,48	-0,33	-0,15	0,10	0,33	0,46	0,53	0,54	0,56	0,50
ITA	0,12	0,14	0,21	0,26	0,32	0,29	0,15	-0,06	-0,22	-0,30	-0,31

Graphic 4: **EXPORTS**



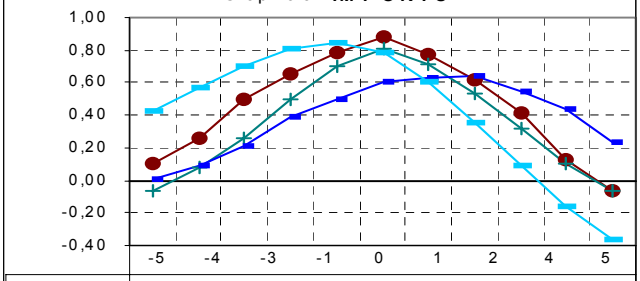
	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	-0,36	-0,30	-0,07	0,15	0,38	0,61	0,61	0,57	0,46	0,26	0,13
CAN	0,21	0,30	0,40	0,50	0,62	0,69	0,51	0,35	0,17	-0,05	-0,23
JPN	-0,06	-0,08	-0,16	-0,19	-0,21	-0,16	-0,14	-0,02	0,07	0,20	0,23
SUI	0,26	0,41	0,55	0,67	0,71	0,65	0,45	0,19	-0,05	-0,25	-0,39

Graphic 5: **IMPORTS**



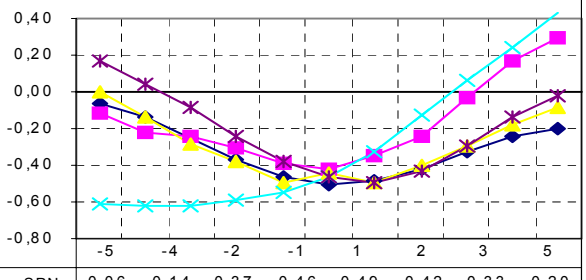
	-5	-4	-3	-2	-1	1	2	3	4	5
SPN	0,22	0,35	0,49	0,61	0,67	0,59	0,45	0,28	0,12	0,03
FRA	0,04	0,21	0,37	0,53	0,71	0,68	0,48	0,27	0,02	-0,15
UK	-0,05	0,07	0,26	0,43	0,63	0,66	0,59	0,43	0,26	0,15
USA	0,34	0,43	0,53	0,63	0,74	0,71	0,51	0,28	0,07	-0,20
ITA	-0,03	0,13	0,31	0,51	0,70	0,67	0,43	0,13	-0,12	-0,26

Graphic 5: **IMPORTS**



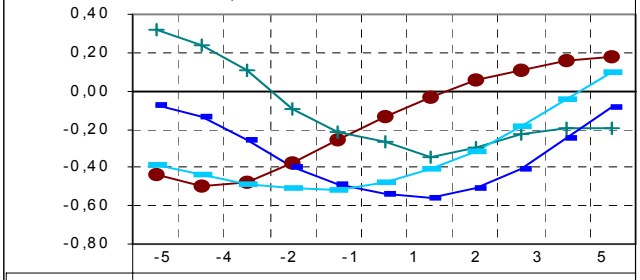
	-5	-4	-3	-1	0	1	2	4	5
GER	0,10	0,26	0,50	0,78	0,88	0,77	0,61	0,12	-0,06
CAN	-0,06	0,07	0,26	0,70	0,81	0,71	0,54	0,10	-0,07
JPN	0,01	0,09	0,21	0,49	0,61	0,63	0,64	0,43	0,24
SUI	0,43	0,57	0,71	0,85	0,78	0,61	0,36	-0,16	-0,36

Graphic 6: **NET EXPORTS**



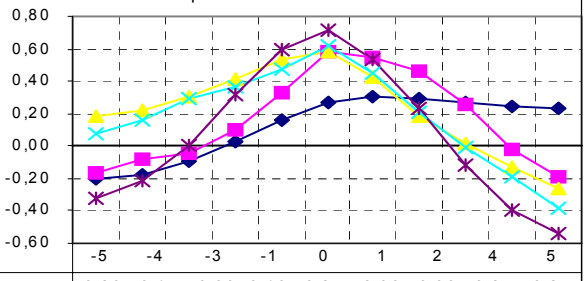
	-5	-4	-2	-1	1	2	3	5
SPN	-0,06	-0,14	-0,37	-0,46	-0,49	-0,42	-0,33	-0,20
FRA	-0,11	-0,22	-0,31	-0,39	-0,34	-0,24	-0,04	0,29
UK	0,00	-0,13	-0,38	-0,49	-0,49	-0,40	-0,29	-0,08
USA	-0,61	-0,62	-0,59	-0,55	-0,33	-0,13	0,06	0,43
ITA	0,17	0,04	-0,24	-0,38	-0,49	-0,44	-0,30	-0,02

Graphic 6: **NET EXPORTS**



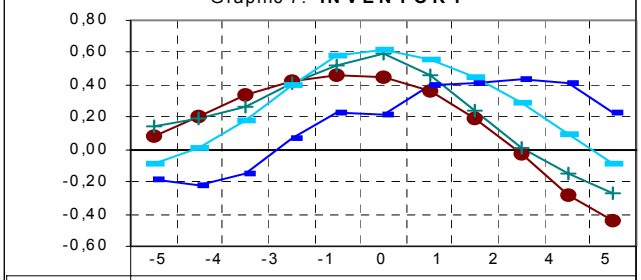
	-5	-4	-2	-1	1	2	3	5
GER	-0,44	-0,50	-0,38	-0,26	-0,03	0,05	0,11	0,18
CAN	0,32	0,24	-0,09	-0,22	-0,34	-0,30	-0,22	-0,19
JPN	-0,07	-0,13	-0,40	-0,48	-0,56	-0,51	-0,40	-0,08
SUI	-0,38	-0,44	-0,51	-0,51	-0,41	-0,31	-0,19	0,09

Graphic 7: **INVENTORY**



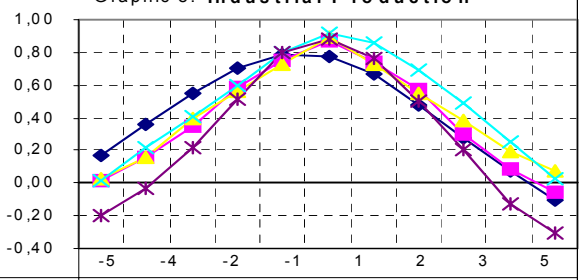
	-5	-4	-3	-1	0	1	2	4	5
SPN	-0,20	-0,17	-0,09	0,16	0,27	0,30	0,30	0,25	0,24
FRA	-0,16	-0,08	-0,05	0,32	0,58	0,55	0,46	-0,02	-0,19
UK	0,18	0,22	0,31	0,53	0,58	0,42	0,19	-0,13	-0,26
USA	0,08	0,17	0,29	0,47	0,61	0,45	0,21	-0,19	-0,38
ITA	-0,32	-0,21	0,01	0,60	0,71	0,53	0,24	-0,39	-0,54

Graphic 7: **INVENTORY**



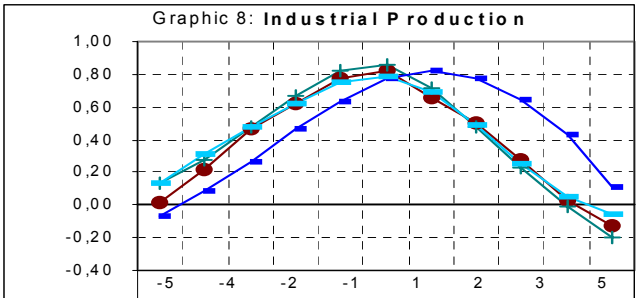
	-5	-4	-3	-1	0	1	2	4	5
GER	0,08	0,21	0,34	0,46	0,45	0,36	0,19	-0,28	-0,44
CAN	0,14	0,19	0,26	0,52	0,59	0,45	0,24	-0,15	-0,27
JPN	-0,19	-0,22	-0,15	0,22	0,22	0,40	0,41	0,41	0,22
SUI	-0,09	0,01	0,18	0,58	0,62	0,56	0,45	0,09	-0,09

Graphic 8: **Industrial Production**



	-5	-4	-2	-1	1	2	3	5
SPN	0,17	0,36	0,70	0,79	0,66	0,48	0,28	-0,11
FRA	0,02	0,16	0,58	0,75	0,74	0,57	0,30	-0,05
UK	0,03	0,16	0,56	0,73	0,73	0,55	0,39	0,07
USA	0,02	0,21	0,59	0,80	0,85	0,70	0,49	0,03
ITA	-0,20	-0,04	0,51	0,79	0,76	0,50	0,20	-0,30

Graphic 8: **Industrial Production**



	-5	-4	-2	-1	1	2	3	5
GER	0,01	0,21	0,63	0,78	0,66	0,51	0,28	-0,13
CAN	0,13	0,28	0,67	0,83	0,71	0,48	0,23	-0,20
JPN	-0,06	0,09	0,46	0,63	0,83	0,77	0,65	0,11
SUI	0,14	0,31	0,62	0,76	0,69	0,49	0,25	-0,06

Investment is, as consumption, strongly procyclical and coincident in all the countries. Generally it is more correlated with the GDP than consumption. Investment is uniformly more volatile than output, their relative volatility ranges from 2.3 in Japan to 3.7 in Spain. This result is in accordance with the standard theories that predict wide fluctuations in investment goods, when agents exploit the possibilities of intertemporal substitution or due to the uncertainty that all investor process bears.

When BK is used, the correlations also increase slightly, but in contrast with consumption, some countries become lagged and others leaded, that is, there is no clear relationship between the high frequencies of output and investment.

In contrast to the two previous variables, the public consumption does not present a common cyclical behaviour for all the economies. If we only pay attention to the maximum correlation in absolute value, public consumption would be procyclical for five countries (USA, SPN, ITA, GER and SUI) and countercyclical for four (FRA, UK, CAN and JPN). The behaviour of the relative phase shift with GDP is not common among countries either.

If the BK filter is used, correlations increase; there is also a country, Canada that would change from countercyclical to procyclical. This drastic change is not due to the reason that the BK filter drastically changes the structure of the correlation for Canada, in fact the structure of the correlations are really similar with the HP and BK filters. The change is due to the presence of correlations with similar magnitudes but contrary signs in the two extremes of the correlation window. This fact, as it was pointed out in previous sections, indicates the convenience of enlarging the criteria to classify the variables: the whole set of correlations should be analysed to establish similarities among countries.

Regarding this new criterion, we can classify most of the countries in two differentiated groups. Firstly, France, Italy and Japan have a decreasing correlation structure, that is, for these countries the government expenditure is procyclical for the leads and countercyclical for the lags. The second group of countries (Germany, Canada, the UK and the USA) presents an increasing shape in their structure of correlations, in other words, they are countercyclical for the leads and procyclical for the lags. When we use BK filter the characteristics of these two groups of countries remain stable.

Public consumption is less volatile than output. Spain and Japan show the bigger relative volatility, while Italy the lowest. When we filter with first difference filter the

relative volatility increases in all the countries; that means that public consumption is more variable than GDP in the high frequencies, since first difference filter amplifies the high frequencies.

Exports is another variable where focussing only on the maximum correlation, can mislead the results. In our opinion, as it can be seen in Table 2 and Graph 4, if we do not analyse all the correlation structure we cannot find out the real similarities between countries, leading us to erroneous conclusions in three countries. For example, Spain and the USA would be classified as countercyclical in spite of the fact that the structure of their correlations is similar to those from the other countries. Additionally Japanese exports would be procyclical, although its correlation structure has the inverse shape, to the typical one. Then, taking into account the complete set of correlations, we conclude that exports are strongly procyclical (Spain and Italy weakly) in all countries except Japan where they present a markedly different dynamic behaviour, showed by his persistent commercial surpluses. These results remain stable when we use BK or first difference filter.

The cycle of exports is coincident with GDP cycle except for Switzerland, Italy and Spain where it is leading, possibly indicating that external sector has a role in their recoveries, while exports are lagged for Germany and the USA, countries generally associated with the locomotive effect.

Exports are more volatile than output. Relative volatility range between 1.7 and 3, being the Japanese economy that presents the highest volatility.

Imports, see Table 2 and Graph 5, are strongly procyclical and coincident, with the only exceptions of Japan were imports are lagged by two quarters, and Switzerland and Spain leading by one quarter the GDP cycle. Imports are between two and four times more volatile than GDP, being in all the countries (except Germany) more volatiles than exports.

Net Exports are countercyclical in all the countries, maximum correlation ranges from –0.35 and –0.60. Logically it is due to the fact that imports are more procyclical than exports. Cycle of net exports is coincident in Spain and France, lagged in the UK, Italy, Canada and Japan, while they are leading in the USA, Germany and Switzerland. The volatility of net exports is very similar among countries, with the exception of the USA and, mainly, Japan, countries that present a smaller volatility. The reason could be

that they are big and relatively closed economies, like is pointed out in Blackburn and Ravn (1992).

Stocks are also strongly procyclical, except for Japan and Spain where they are also procyclical but only weakly. It should be noticed that with BK filter, correlations increase significantly, except for Spain. Stocks are coincident, again with the exception of Japan and Spain, where they are lagged. Variability is smaller than the GDP one. The two economies with smaller variability are those with smaller correlations, that is, Japan and Spain.

Industrial production is strongly procyclical and generally coincident, it has higher volatility than GDP cycle, between 1.7 and 2.8 times, revealing that the services sector is more stable than the industrial one.

The previous results show that, generally and with the unique exception of public consumption, there are great similarities in the cyclical behaviour of the real variables. These similarities give us the impression that business cycles are a similar phenomena among countries, at least for real variables.

3.1.2) Prices and monetary variables.

Traditionally, the behaviour of nominal variables and prices, has been a recurrent object of study in business cycle research, analysing the hypothesis that the monetary policy is one of the main causes of business cycles. If monetarist theory were true, it would be expected that nominal money were procyclical and leading.

Previous studies indicate that the relationship between money and GDP relies on the filter and on the definition of money used. Also, they do not find a uniform cyclical behaviour among countries.

Here we use only a single measure of the nominal money, then we will employ a measure which will be as homogeneous as possible; therefore we use the sum of money and quasymoney from the International Monetary Found.

The results, showed in Table 3, indicate that nominal money is generally procyclical. It is weakly procyclical in Spain, France, the UK, Switzerland and the USA, being strongly procyclical in Germany and Japan. Nominal money is only leading in Spain, Switzerland and the USA, while for Japan and the UK is coincident with GDP

cycle, and finally is lagged in Germany. There are two countries, Italy and Canada, where nominal money is countercyclical. This fact contradicts the monetary paradigm and is contrary to the traditional vision of the monetary policy. These results basically do not change when the BK and first difference filters are used.

Nominal money is more volatile than GDP. France, the UK, and Spain are in this order the countries with the highest volatilities.

TABLE 3: *Monetary variables (Maximum correlations with GDP)*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
MQM	0.21	0.23	0.26	0.28	-0.40	0.57	-0.45	0.63	0.48
	-4	0	2	-4	2	2	-2	0	-2
DEF	-0.47	-0.54	-0.61	-0.75	-0.73	-0.65	-0.56	-0.68	0.67
	-4	-2	0	-1	-4	-2	-3	-2	5
INF	0.21	0.25	0.45	0.58	0.58	0.42	0.37	0.61	0.32
	2	2	5	4	0	2	1	2	0
In	0.46	0.42	-0.66	-0.53	-0.58	-0.37	-0.58	0.31	0.56
	4	5	-5	-5	-4	-5	-5	5	3
V	-0.33	-0.25	-0.27	-0.51	0.68	-0.20	0.62	-0.67	0.59
	-5	-3	2	-5	1	5	-1	-2	4
MR	0.42	0.36	0.42	0.67	0.66	0.38	0.50	0.80	0.58
	-3	-1	1	-2	-4	1	3	-1	-3

* HP filter (1970:2-1993:4). For each variable, the first row contains the maximum (in absolute value) correlation with the GDP. The number in the second row shows when the maximum correlation is reached; for example, 4 would indicate that the maximum correlation is between GDP_t and X_{t-4}, then the variable X leads four quarters GDP cycle.

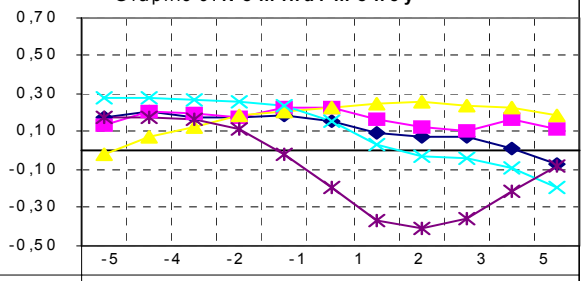
TABLE 4: *Monetary variables (relative volatilities)*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
MQM	3.61	6.19	4.58	1.40	1.64	1.80	2.06	1.85	2.09
DEF	1.44	1.08	1.52	0.59	1.39	0.43	1.17	1.38	0.76
INF	0.54	0.54	0.61	0.19	0.47	0.21	0.36	0.54	0.37
In	7.29	8.28	5.60	5.24	7.42	6.61	5.17	7.50	7.52
V	3.26	5.70	4.40	1.12	2.30	2.61	1.55	1.85	2.09
MR	3.38	5.92	4.72	1.22	1.96	2.81	1.30	2.47	2.11

* HP filter (1970:2-1993:4). Relative volatilities to GDP.

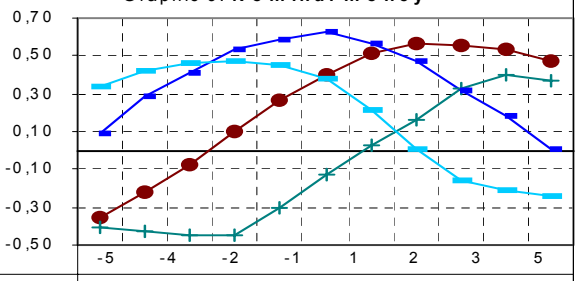
Lucas (1977) mentions as a stylised fact that prices are procyclical, this result led him to propose monetary models to explain the cycle. However, several papers have been cast doubt on this fact. Backus and Kehoe (1992) find that the behaviour of prices has

Graphic 9: **Nominal money**



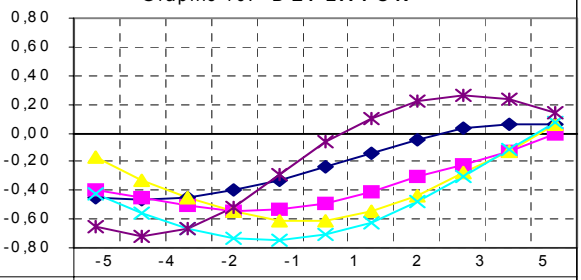
	-5	-4	-2	-1	1	2	3	5
SPN	0,18	0,21	0,17	0,18	0,09	0,08	0,07	-0,07
FRA	0,14	0,20	0,18	0,23	0,16	0,12	0,10	0,11
UK	-0,02	0,07	0,19	0,20	0,25	0,26	0,24	0,19
USA	0,28	0,28	0,26	0,23	0,04	-0,02	-0,04	-0,19
ITA	0,18	0,17	0,12	-0,02	-0,37	-0,40	-0,36	-0,08

Graphic 9: **Nominal money**



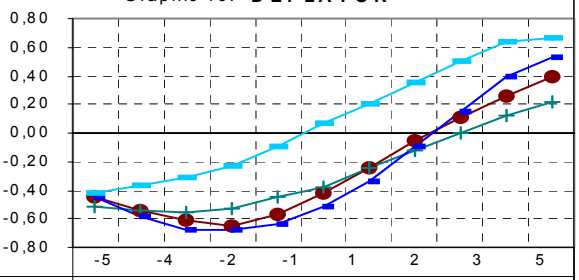
	-5	-4	-2	-1	1	2	3	5
GER	-0,35	-0,22	0,09	0,27	0,51	0,57	0,56	0,47
CAN	-0,41	-0,43	-0,45	-0,31	0,03	0,17	0,32	0,37
JPN	0,09	0,29	0,53	0,59	0,56	0,47	0,32	0,00
SUI	0,34	0,43	0,48	0,45	0,22	0,00	-0,15	-0,24

Graphic 10: **DEFLATOR**



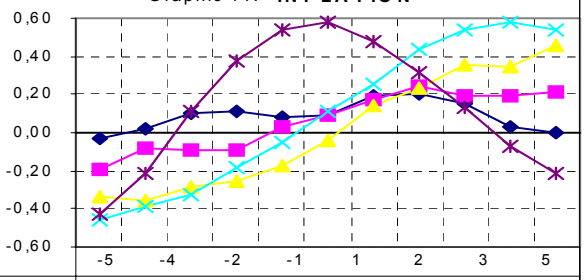
	-5	-4	-2	-1	1	2	3	5
SPN	-0,44	-0,47	-0,40	-0,33	-0,14	-0,04	0,03	0,06
FRA	-0,39	-0,45	-0,54	-0,53	-0,41	-0,30	-0,22	-0,01
UK	-0,17	-0,33	-0,55	-0,61	-0,54	-0,43	-0,28	0,06
USA	-0,43	-0,56	-0,74	-0,75	-0,63	-0,48	-0,30	0,07
ITA	-0,65	-0,73	-0,52	-0,29	0,10	0,22	0,26	0,14

Graphic 10: **DEFLATOR**



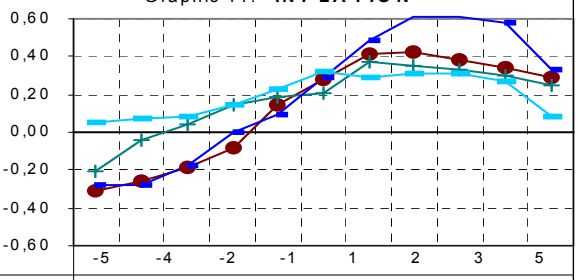
	-5	-4	-2	-1	1	2	3	5
GER	-0,45	-0,54	-0,65	-0,56	-0,24	-0,06	0,11	0,39
CAN	-0,52	-0,55	-0,53	-0,45	-0,25	-0,12	0,01	0,21
JPN	-0,45	-0,59	-0,68	-0,63	-0,34	-0,10	0,15	0,53
SUI	-0,42	-0,37	-0,23	-0,10	0,21	0,35	0,50	0,67

Graphic 11: **INFLATION**



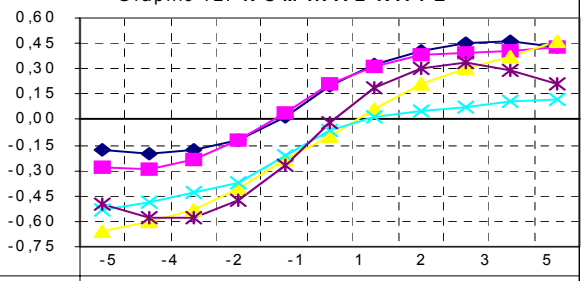
	-5	-4	-2	-1	1	2	3	5
SPN	-0,03	0,02	0,11	0,08	0,19	0,21	0,15	0,00
FRA	-0,19	-0,08	-0,09	0,03	0,18	0,25	0,19	0,22
UK	-0,33	-0,36	-0,25	-0,17	0,15	0,23	0,35	0,45
USA	-0,46	-0,38	-0,19	-0,05	0,25	0,44	0,54	0,54
ITA	-0,43	-0,22	0,38	0,54	0,48	0,32	0,13	-0,21

Graphic 11: **INFLATION**



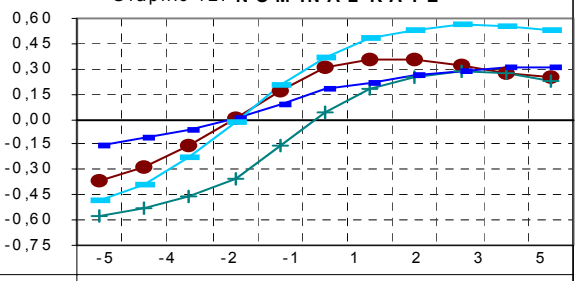
	-5	-4	-2	-1	1	2	3	5
GER	-0,31	-0,26	-0,08	0,14	0,42	0,42	0,38	0,29
CAN	-0,21	-0,04	0,15	0,18	0,37	0,35	0,33	0,25
JPN	-0,28	-0,27	0,00	0,10	0,49	0,61	0,61	0,33
SUI	0,05	0,07	0,14	0,23	0,29	0,31	0,31	0,08

Graphic 12: **NOMINAL RATE**



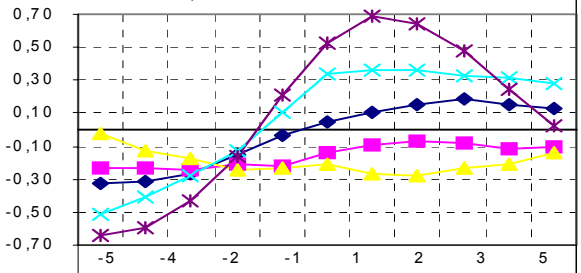
	-5	-4	-2	-1	1	2	3	5
SPN	-0,18	-0,20	-0,12	0,02	0,33	0,41	0,45	0,43
FRA	-0,28	-0,29	-0,12	0,04	0,31	0,39	0,39	0,42
UK	-0,66	-0,60	-0,40	-0,24	0,06	0,21	0,31	0,46
USA	-0,53	-0,48	-0,37	-0,21	0,02	0,05	0,07	0,12
ITA	-0,50	-0,58	-0,47	-0,27	0,19	0,30	0,34	0,21

Graphic 12: **NOMINAL RATE**



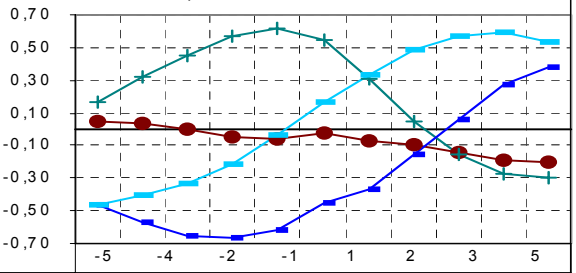
	-5	-4	-2	-1	1	2	3	5
GER	-0,37	-0,29	0,01	0,17	0,36	0,36	0,32	0,25
CAN	-0,58	-0,53	-0,36	-0,16	0,18	0,25	0,28	0,23
JPN	-0,15	-0,11	0,01	0,09	0,22	0,26	0,28	0,31
SUI	-0,49	-0,39	-0,01	0,20	0,48	0,54	0,56	0,53

Graphic 13: **VELOCITY**



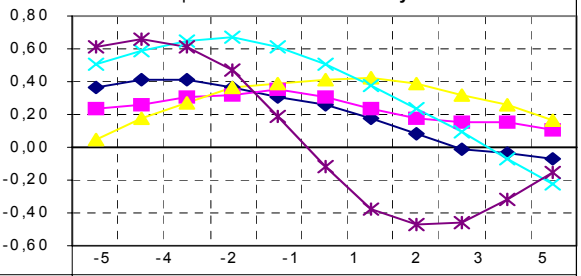
	-5	-4	-2	-1	1	2	3	5
SPN	-0,33	-0,32	-0,15	-0,04	0,10	0,16	0,19	0,12
FRA	-0,24	-0,23	-0,21	-0,23	-0,10	-0,07	-0,08	-0,11
UK	-0,02	-0,12	-0,24	-0,24	-0,26	-0,27	-0,23	-0,14
USA	-0,51	-0,41	-0,13	0,10	0,37	0,36	0,33	0,28
ITA	-0,64	-0,59	-0,16	0,21	0,68	0,64	0,48	0,02

Graphic 13: **VELOCITY**



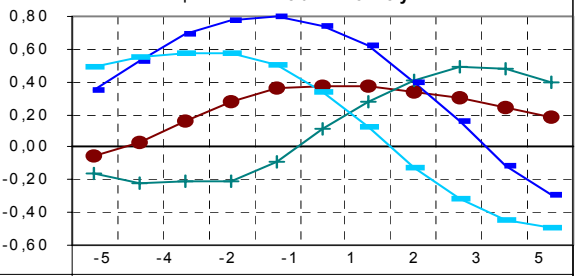
	-5	-4	-2	-1	1	2	3	5
GER	0,05	0,03	-0,04	-0,06	-0,07	-0,10	-0,14	-0,20
CAN	0,17	0,32	0,57	0,62	0,31	0,05	-0,15	-0,30
JPN	-0,46	-0,57	-0,67	-0,62	-0,37	-0,15	0,06	0,39
SUI	-0,47	-0,41	-0,21	-0,04	0,34	0,49	0,57	0,53

Graphic 14: **Real Money**



	-5	-4	-2	-1	1	2	3	5
SPN	0,36	0,41	0,37	0,31	0,18	0,08	-0,01	-0,07
FRA	0,24	0,25	0,31	0,36	0,24	0,18	0,15	0,11
UK	0,05	0,17	0,36	0,39	0,42	0,39	0,32	0,16
USA	0,50	0,58	0,67	0,61	0,38	0,24	0,09	-0,22
ITA	0,61	0,66	0,47	0,19	-0,37	-0,47	-0,45	-0,16

Graphic 14: **Real Money**



	-5	-4	-2	-1	1	2	3	5
GER	-0,05	0,03	0,28	0,36	0,38	0,34	0,30	0,18
CAN	-0,16	-0,22	-0,21	-0,09	0,27	0,41	0,50	0,39
JPN	0,34	0,52	0,77	0,80	0,62	0,40	0,16	-0,30
SUI	0,50	0,55	0,57	0,50	0,13	-0,13	-0,31	-0,49

varied drastically since Second World War, being procyclical before and becoming countercyclical after. This result has also been obtained in other papers, like Cooley and Ohanian (1991).

In our study, see Table 3, prices are strongly countercyclical, between –0.5 and –0.7, and leading, with the unique exception of the UK where they are coincident.

If we only focused on the maximum correlations then Switzerland would present a markedly different behaviour from the rest of countries, but if we focus on the whole correlation set, the structure of their correlations does not seem so different. Typically the structure of correlations presents negative values for the leads and positive for the lags, like it can be seen in Graph 10.

The result that prices are countercyclical for the leads, supports the hypothesis that cycles are conducted fundamentally by supply shocks, since the fall in prices is followed by an expansion in output. On the other hand, positive correlations for the lags seem to be coherent with the idea that an increase in real product will cause a future increase in prices, which, as it is showed by the results, it would be stronger in Switzerland.

Those results remain stable if we use BK filter. When we filter by means of first differences, the correlations fall, but prices continue being leading countercyclical, except in Italy (procyclical) and France and Canada (acyclical).

Prices are more volatile than GDP (see Table 4), now the exceptions are Switzerland, the USA, and Germany. This last country shows (for the three filter methods) the lowest volatility. This fact should not be surprising given the traditional aversion of German authorities to the variation of prices.

Inflation, if we focus on the maximum correlations, is procyclical and lagged (Italy and Switzerland coincidental). All countries show a typical correlation structure, consisting of negative correlations for high leads and positive ones for the lags, that is, it is growing. Inflation is less volatile than GDP; relative volatilities are located between 0.6 and 0.2. The two countries with the smallest levels are the USA and Germany again.

Nominal interest rates have also analogous correlation structure for all the countries, which are increasing, that is they are negatively correlated with future GDP and positively correlated with past GDP. This variable is another typical case in which only focus on the maximum correlations masks cyclical similarities among countries: if we used this criterion, four countries would be procyclical and five would be classified as

countercyclical. Volatility in nominal rates is between five and seven times greater than that of GDP one.

Velocity of money and real money does not have uniform cyclical behaviour among countries. Results basically remain when BK and first difference filters were used.

Monetary variables, contrary to the real ones, do not present as many similarities in their cyclical behaviour, possibly indicating differences in implementation and/or in the objective pursued by monetary policy. This last result together with the great similarities in real variables, cast doubts on the idea that money is one of the main causes of business cycles. Also, the fact that prices are countercyclical does not favour a monetary vision of cycle either.

3.1.3) Labour Market.

Employment is strongly procyclical and lagged, excluding Spain and France where is coincidental but with very little difference between contemporary correlation and correlation in one period lagged, that is in t+1. Its variability is smaller than the GDP, with the single exception of Spain, where is slightly greater. These results, that the employment was lagged and fluctuates less than GDP, seem to indicate the existence of labour hoarding.

Productivity, measured as the ratio of the GDP to employment, has also analogous structures in their correlations for all the countries. They are positive for the whole window away from the third lag, since correlations become negative. Then productivity is strongly procyclical (Spain weakly), and coincident (leading in Spain and Switzerland). With BK filter correlations increase slightly, and with first differences some countries (Spain, France, Germany and the UK) increase their correlation, phenomenon that is not very frequent for any of the variables analysed. Volatility of the productivity is smaller than GDP ones (the USA has the lowest (0.6)). Using first difference filter, the relative volatility increases in all countries.

TABLE 5: *Labour market (Maximum correlations with GDP)*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
L	0.75	0.81	0.80	0.91	0.54	0.81	0.81	0.72	0.90
	0	0	2	1	2	1	1	2	1
PRO	0.32	0.92	0.68	0.79	0.85	0.74	0.48	0.91	0.69
	-1	0	0	0	0	0	0	0	-1
WN	-0.46	-0.59	-0.57	-0.51	-0.55	-0.38	-0.59	-0.37	0.79
	-3	-2	-2	-2	-5	-2	-2	-3	5
WR	-0.24	-0.51	0.35	0.65	-0.20	0.12	0.26	0.33	0.23
	0	-4	0	-1	1	2	-5	-1	-1

* HP filter (1970:2-1993:4). For each variable, the first row contains the maximum (in absolute value) correlation with the GDP. The number in the second row shows when the maximum correlation is reached; for example, 4 would indicate that the maximum correlation is between GDP_t and X_{t-4}, then the variable X leads four quarters GDP cycle.

TABLE 6: *Labour market (relative volatilities)*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
L	1.04	0.45	0.74	0.62	0.53	0.67	0.83	0.35	0.74
PRO	0.72	0.68	0.78	0.57	0.90	0.67	0.74	0.84	0.58
WN	2.04	1.49	1.31	0.43	1.72	0.69	1.14	1.58	0.71
WR	1.68	0.68	0.83	0.37	0.94	0.62	0.99	1.23	0.40

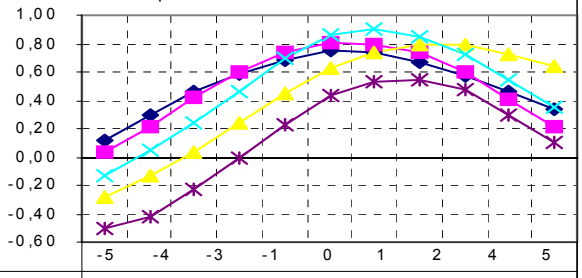
* HP filter (1970:2-1993:4). Relative volatilities to GDP.

RBC models explain the prociclycality of productivity almost by definition, although it should be leading and data says that, normally, is coincident with GDP. Keynesian models, where cycles are fundamentally caused by demand shocks, need to incorporate phenomena such as labour hoarding to be able to explain procyclicality.

Nominal wages, as you can see in Table 5, are countercyclical, (between –0.4 and –0.6) and leading in all the countries, except Switzerland. In this country it would be procyclical because maximum correlation is positive, but if we look at the complete correlation structure, it is not very different for the rest of the countries (see Graph 17). Then, it is possible that nominal wages are different in Switzerland, but keeping in mind the complete set of correlations tinges this difference.

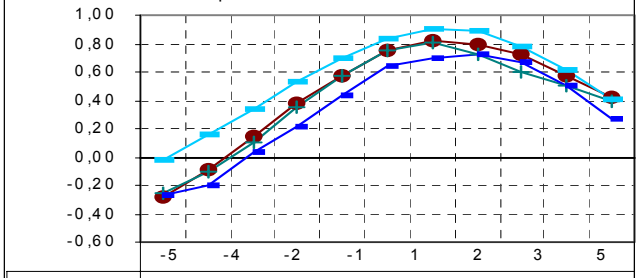
With BK filter correlations increase in all the countries, and now in Germany we can observe the same results than Switzerland; however, it seems evident that the correlation structure is similar for all countries. If we filter by first differences, the results vary considerably: in all countries nominal wages become acyclical, indicating that GDP and nominal wages are not related at the high frequencies.

Graphic 15: **EMPLOYMENT**



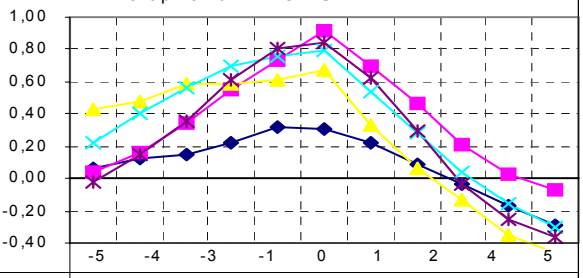
	-5	-4	-3	-1	0	1	2	4	5
SPN	0,11	0,29	0,47	0,69	0,75	0,74	0,67	0,46	0,33
FRA	0,04	0,21	0,42	0,73	0,81	0,80	0,74	0,41	0,21
UK	-0,29	-0,13	0,04	0,45	0,63	0,74	0,80	0,73	0,64
USA	-0,13	0,05	0,24	0,69	0,87	0,91	0,85	0,54	0,35
ITA	-0,50	-0,42	-0,23	0,23	0,43	0,54	0,54	0,29	0,10

Graphic 15: **EMPLOYMENT**



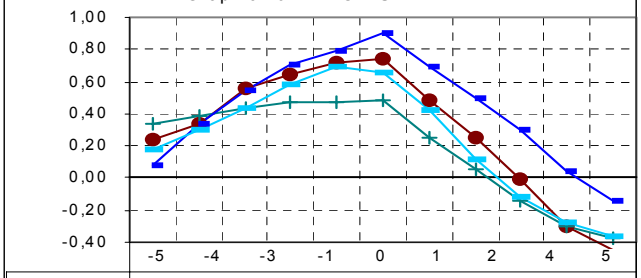
	-5	-4	-2	-1	1	2	3	5
GER	-0,28	-0,09	0,38	0,58	0,81	0,80	0,72	0,41
CAN	-0,25	-0,10	0,35	0,58	0,81	0,72	0,61	0,40
JPN	-0,27	-0,20	0,21	0,43	0,70	0,72	0,66	0,26
SUI	-0,02	0,15	0,53	0,70	0,90	0,89	0,78	0,40

Graphic 16: **PRODUCTIVITY**



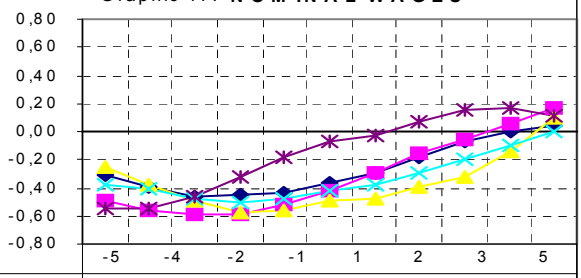
	-5	-4	-3	-1	0	1	2	4	5
SPN	0,07	0,13	0,15	0,32	0,31	0,22	0,09	-0,16	-0,29
FRA	0,04	0,16	0,34	0,73	0,92	0,70	0,47	0,03	-0,07
UK	0,43	0,47	0,58	0,61	0,68	0,34	0,07	-0,35	-0,46
USA	0,22	0,40	0,57	0,76	0,79	0,53	0,28	-0,15	-0,30
ITA	-0,03	0,15	0,36	0,81	0,85	0,63	0,30	-0,26	-0,37

Graphic 16: **PRODUCTIVITY**



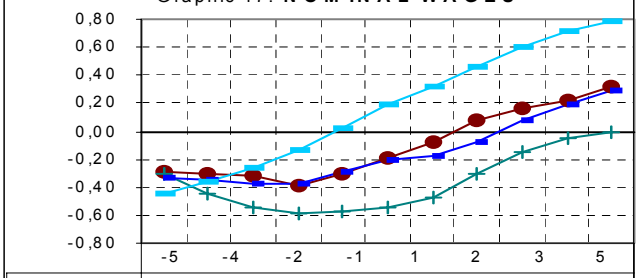
	-5	-4	-3	-1	0	1	2	4	5
GER	0,24	0,34	0,55	0,72	0,74	0,48	0,25	-0,31	-0,45
CAN	0,34	0,38	0,44	0,48	0,48	0,25	0,05	-0,30	-0,38
JPN	0,08	0,33	0,55	0,80	0,91	0,70	0,49	0,04	-0,15
SUI	0,18	0,30	0,43	0,69	0,66	0,42	0,12	-0,28	-0,36

Graphic 17: **NOMINAL WAGES**



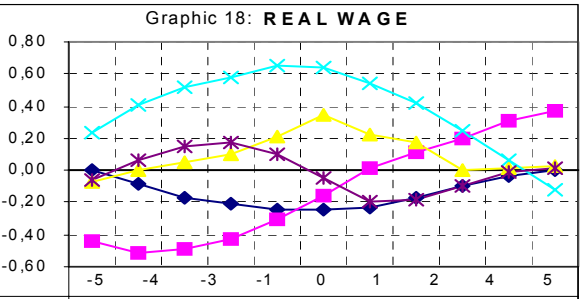
	-5	-4	-2	-1	1	2	3	5
SPN	-0,31	-0,40	-0,45	-0,43	-0,30	-0,18	-0,06	0,04
FRA	-0,49	-0,56	-0,59	-0,53	-0,29	-0,16	-0,06	0,16
UK	-0,25	-0,38	-0,57	-0,57	-0,48	-0,39	-0,32	0,09
USA	-0,38	-0,41	-0,51	-0,47	-0,38	-0,29	-0,19	0,00
ITA	-0,55	-0,55	-0,32	-0,18	-0,03	0,07	0,15	0,12

Graphic 17: **NOMINAL WAGES**



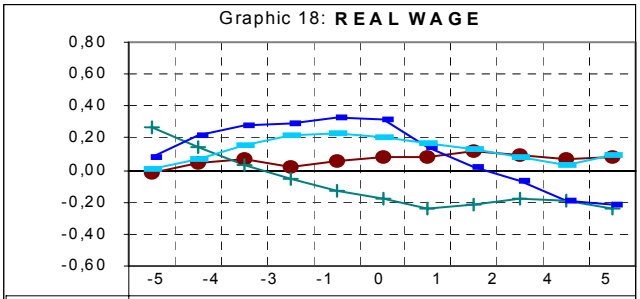
	-5	-4	-2	-1	1	2	3	5
GER	-0,29	-0,30	-0,38	-0,30	-0,08	0,07	0,16	0,32
CAN	-0,31	-0,44	-0,59	-0,58	-0,47	-0,31	-0,15	0,00
JPN	-0,33	-0,34	-0,37	-0,29	-0,18	-0,07	0,08	0,30
SUI	-0,45	-0,36	-0,13	0,02	0,32	0,46	0,60	0,79

Graphic 18: **REAL WAGE**



	-5	-4	-3	-1	0	1	2	4	5
SPN	0,00	-0,09	-0,17	-0,24	-0,24	-0,23	-0,17	-0,04	0,00
FRA	-0,44	-0,51	-0,49	-0,31	-0,16	0,02	0,12	0,31	0,37
UK	-0,07	0,01	0,05	0,21	0,35	0,22	0,18	0,01	0,03
USA	0,24	0,41	0,51	0,65	0,64	0,55	0,42	0,06	-0,12
ITA	-0,06	0,06	0,15	0,09	-0,05	-0,20	-0,18	-0,02	0,02

Graphic 18: **REAL WAGE**



	-5	-4	-3	-1	0	1	2	4	5
GER	-0,02	0,04	0,07	0,06	0,09	0,08	0,12	0,06	0,08
CAN	0,26	0,14	0,04	-0,13	-0,18	-0,25	-0,22	-0,19	-0,24
JPN	0,09	0,22	0,28	0,33	0,32	0,15	0,01	-0,19	-0,21
SUI	0,01	0,07	0,15	0,23	0,20	0,17	0,13	0,03	0,09

Volatility in nominal wages, as we can see in Table 6, shows a wide range, between 0.43 and 2 times the volatility of GDP. The USA, Germany and Switzerland are the economies with the lowest volatility and Spain presents the highest.

It should be noticed the great similarity in the cyclical behaviour of prices and nominal wages, showed by their correlation structure; even the special feature in Switzerland was found in both variables, in fact the correlations between wages and prices are in many countries higher than 0.7. This similarity in the behaviour in prices and nominal wages is coherent with an environment of indexing of wages or with a transfer of higher production costs to higher prices. Looking at the relative volatility between prices and wages, we did not find uniform performance: five countries (Spain, France, Italy, Germany and Japan) have wages more variables than prices, while in the USA and the UK prices are more volatile. In Switzerland and Japan they have similar volatility.

Contrary to the three previous variables, real wages do not present a common behaviour among countries: a great variety of structures exist in their correlations. Real wages are clearly procyclical in four countries, concretely in the USA (strongly procyclical), and in Switzerland, Japan and the UK. In Spain and Canada, as we can see in Graph 18, real wages present the opposite behaviour, they are countercyclical, although the magnitude of their correlations is very low. In the other countries it is difficult to classify real wages as procyclical or countercyclical. Germany could be considered as procyclical, since although with HP filter it is acyclical (the maximum correlation is 0.12), with BK filter the structure of correlations remains stable but now the maximum is 0.35. Italy could be classified as lagged countercyclical, but it also presents positive correlations with similar magnitudes in the opposite side of the correlation window. Finally, France has a growing structure in its correlations, the negative ones being also higher.

Looking at the whole set of correlations, we could consider real wages as procyclical in the USA, the UK, Switzerland, Germany and Japan. They would be countercyclical in the rest of countries. Nevertheless, results are not so clear as in other variables. However, these conclusions are confirmed when the correlations between real wages and industrial production index, another variable representative of the level of activity, were calculated.

RBC models predict that real wages are procyclical, while in oriented Keynesian models, where fluctuations are demand driven, they would be countercyclical. RBC models need to incorporate demand shocks to explain countercyclicallity of wages and Keynesian models need phenomena like labour hoarding, price rigidities or other market imperfections, to obtain procyclical real wages.

While according to this variable results are not conclusive, we tried to obtain more information analysing the relationship between real wages and the rest of variables representative of the labour market, just as Dimelis (1997) made for the American economy.

TABLE 7 **:** Cross-correlations with the employment.

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
PRO	-0.38	0.57	-0.61	0.68	-0.47	-0.62	-0.55	0.62	0.53
	0	-2	5	-2	4	5	5	-3	-3
WN	-0.17	-0.48	-0.53	-0.59	0.48	0.43	-0.73	0.26	0.90
	-4	-5	-3	0	4	-4	5	5	
WR	-0.14	-0.42	-0.17	0.60	0.16	0.14	-0.54	0.36	0.14
	1	-4	5	-3	0	0	0	-5	5

* HP filter (1970:2-1993:4). For each variable, the first row contains the maximum (in absolute value) correlation with the employment. The number in the second row shows when the maximum correlation is reached; for example, 4 would indicate that the maximum correlation is between L_t and X_{t-4}, then the variable X leads four quarters employment cycle.

TABLE 8**:** Volatilities relative to employment*.

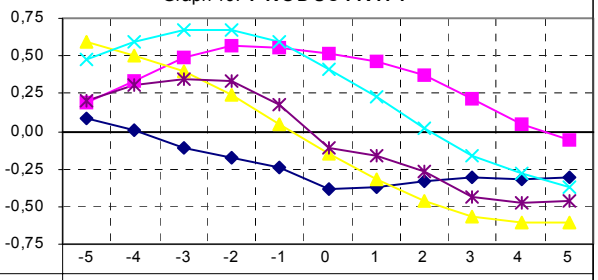
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
PRO	0.69	1.52	1.05	0.91	1.69	0.99	0.89	2.40	0.78
WN	1.95	3.32	1.76	0.69	3.22	1.03	1.36	4.47	0.96
WR	1.60	1.52	1.11	0.60	1.76	0.93	1.18	3.49	0.54

* HP filter (1970:2-1993:4).

The relationship between employment and real wages has been often studied since the papers of Dunlop (1938) and Tharsis (1939), where they cast doubts on the Keynesian idea that real wages were countercyclical in relation to employment. Latter, many papers have been published with very different results. Nickell and Symons (1990)

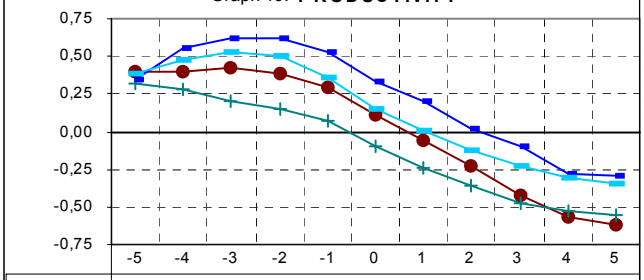
Cross-correlations with employment (HP filter)

Graph 19: **PRODUCTIVITY**



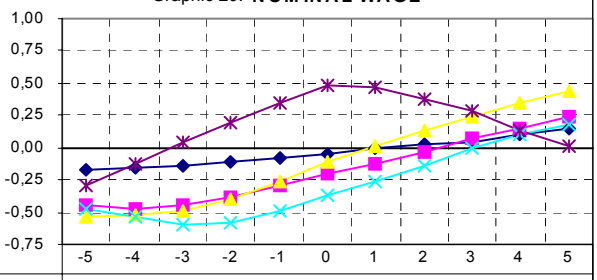
	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	0,08	0,00	-0,11	-0,18	-0,25	-0,38	-0,38	-0,33	-0,31	-0,32	-0,30
FRA	0,19	0,34	0,49	0,57	0,56	0,52	0,46	0,37	0,22	0,05	-0,06
UK	0,59	0,51	0,39	0,24	0,05	-0,15	-0,32	-0,46	-0,56	-0,60	-0,61
USA	0,47	0,60	0,67	0,68	0,59	0,42	0,23	0,02	-0,16	-0,28	-0,38
ITA	0,21	0,31	0,34	0,34	0,18	-0,11	-0,17	-0,27	-0,43	-0,47	-0,46

Graph 19: **PRODUCTIVITY**



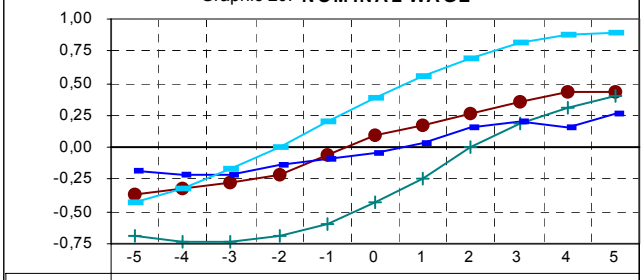
	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	0,40	0,39	0,43	0,38	0,30	0,11	-0,06	-0,23	-0,42	-0,57	-0,62
CAN	0,32	0,28	0,20	0,14	0,07	-0,10	-0,24	-0,36	-0,47	-0,53	-0,55
JPN	0,35	0,55	0,62	0,62	0,53	0,33	0,20	0,02	-0,09	-0,28	-0,30
SUI	0,38	0,48	0,53	0,50	0,35	0,15	0,00	-0,12	-0,23	-0,31	-0,34

Graphic 20: **NOMINAL WAGE**



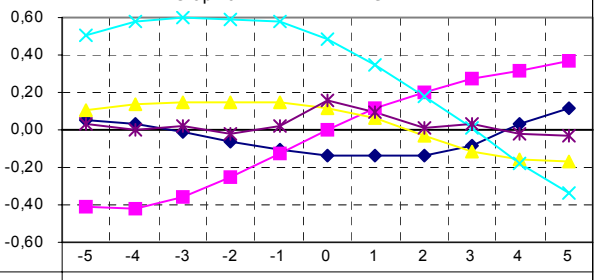
	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	-0,17	-0,16	-0,14	-0,11	-0,08	-0,05	-0,01	0,02	0,04	0,10	0,15
FRA	-0,45	-0,48	-0,45	-0,38	-0,29	-0,20	-0,13	-0,04	0,06	0,16	0,24
UK	-0,53	-0,53	-0,49	-0,40	-0,26	-0,11	0,02	0,13	0,24	0,35	0,44
USA	-0,48	-0,54	-0,59	-0,58	-0,50	-0,38	-0,27	-0,14	0,00	0,10	0,18
ITA	-0,29	-0,13	0,05	0,19	0,34	0,48	0,47	0,38	0,28	0,14	0,01

Graphic 20: **NOMINAL WAGE**



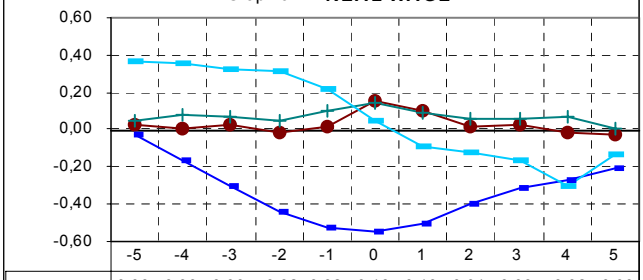
	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	-0,37	-0,32	-0,28	-0,22	-0,06	0,09	0,17	0,26	0,35	0,43	0,43
CAN	-0,69	-0,73	-0,73	-0,69	-0,60	-0,43	-0,24	-0,01	0,18	0,31	0,40
JPN	-0,18	-0,21	-0,22	-0,14	-0,08	-0,04	0,03	0,15	0,21	0,16	0,26
SUI	-0,43	-0,31	-0,17	0,00	0,20	0,39	0,55	0,70	0,82	0,88	0,90

Graphic 21: **REAL WAGE**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	0,05	0,03	-0,01	-0,07	-0,10	-0,14	-0,14	-0,13	-0,08	0,03	0,12
FRA	-0,42	-0,42	-0,36	-0,26	-0,12	0,00	0,12	0,20	0,27	0,31	0,36
UK	0,10	0,14	0,15	0,15	0,14	0,12	0,06	-0,03	-0,11	-0,16	-0,17
USA	0,50	0,58	0,60	0,59	0,57	0,48	0,34	0,18	0,01	-0,18	-0,34
ITA	0,03	0,00	0,03	-0,02	0,02	0,16	0,10	0,01	0,03	-0,02	-0,03

Graphic 21: **REAL WAGE**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
ITA	0,03	0,00	0,03	-0,02	0,02	0,16	0,10	0,01	0,03	-0,02	-0,03
GER	0,05	0,08	0,07	0,05	0,10	0,14	0,09	0,06	0,06	0,07	0,01
CAN	-0,03	-0,17	-0,31	-0,44	-0,53	-0,54	-0,50	-0,39	-0,31	-0,27	-0,21
JPN	0,36	0,35	0,32	0,31	0,22	0,05	-0,09	-0,12	-0,16	-0,30	-0,13

state that the diversity of results is due to incorrect specifications of the tendency and to the use of different deflators.

Here, we obtain that, for the majority of countries, real wages are acyclical regarding to GDP; but there are also economies where they are procyclical (Japan and the USA) or countercyclical (Canada) and even there is a growing structure of correlations in France (see Graph 21 or Table 7).

The labour market has been widely studied in the RBC literature, because on it the predictions of RBC models were poor. One of the main puzzles in the labour market, pointed out by Kydland and Prescott (1989), is the called price puzzle: RBC models predict that employment fluctuates less than wages, because adjustments come fundamentally via prices, however in the USA this does not happen.

Looking at Table 8, this contradictory result with RBC predictions only happens in Switzerland, the USA and to a lesser degree in Germany. For the rest of the countries employment fluctuates less than nominal and real wages.

In conclusion, the behaviour of employment, productivity and nominal wages is similar for all countries, with the possible exception of nominal wages in Switzerland. However, the behaviour of real wages is not common. This fact can be indicative that the type of shocks affecting national labour markets has been different, however this hypothesis seems to contradict the great similarity in the real variables. Therefore, it seems that the different cyclical behaviour in real wages can be due to organisational, cultural, legal or another type of differences in the functioning of national labour markets.

3.1.4) External Variables.

This section analyses the behaviour of the terms of trade, defined as the ratio of import prices to export prices and the exchange rates. Exports, imports and net exports were already studied in section 3.1.1.

If we only focused on the maximum correlations, then terms of trade would be procyclical for four countries and countercyclical in five. However, looking at the whole set of correlations, it can be observed a growing structure in the majority of economies

(see Graph 22). The exceptions are Switzerland, which could be considered as procyclical, and Canada, which has a really different performance from the rest of countries. It presents a falling correlation structure. These results remain stable with BK and first difference filter. The differentiation of Canada is confirmed when we looked at the cross-correlations between terms of trade and imports.

TABLE 9: *External Variables (maximum correlations with GDP)*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
TT	-0.38	-0.41	-0.28	0.61	-0.59	-0.30	0.40	0.42	0.46
	-4	-3	-4	5	-5	-4	-5	5	1
TC	-0.34	-0.23	-0.48	-	-0.33	-0.34	0.29	-0.22	-0.22
	1	2	5	-	3	2	-5	-2	3

* HP filter (1970:2-1993:4). For each variable, the first row contains the maximum (in absolute value) correlation with the GDP. The number in the second row shows when the maximum correlation is reached; for example, 4 would indicate that the maximum correlation is between GDP_t and X_{t-4}, then the variable X leads four quarters GDP cycle.

TABLE 10: *External Variables (relative volatilities to GDP)*.*

	ESP	FRA	GRB	USA	ITA	GER	CAN	JPN	SUI
TT	3.67	3.07	1.62	1.70	2.19	1.71	1.75	4.93	1.42
TC	7.59	8.18	4.95	--	5.85	5.58	1.79	5.98	4.86

* HP filter (1970:2-1993:4).

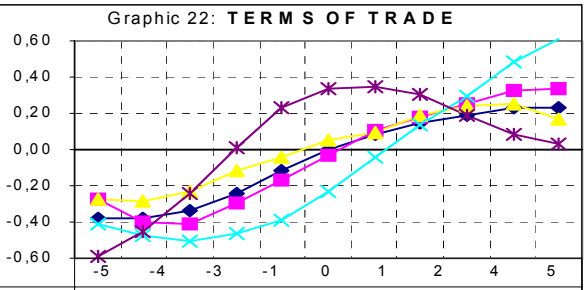
Relative volatility of terms of trade ranges normally between 1.5 and 3, but in Japan they are five times more volatile than GDP.

Exchange rates are countercyclical, that is, during an expansion exchange rates appreciates, but only weakly and lagged, only in Japan they are leading by two quarters. Again Canada shows a completely different behaviour, his exchange rate is leading procyclical.

The volatilities range between 5 and 8, except Canada where the exchange rate is only twice as variable as the GDP. It is necessary to point out that the volatility of exchange rates is dominated by the behaviour of the US dollar. The absolute volatility of

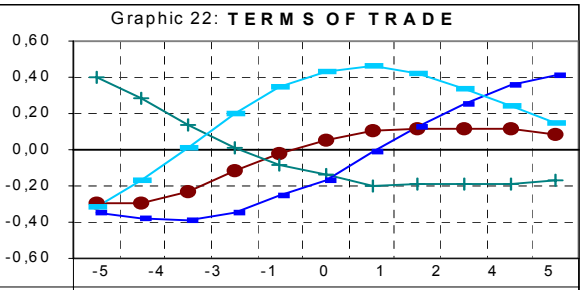
External Variables. Cross-correlations with GDP

Graphic 22: **TERMS OF TRADE**



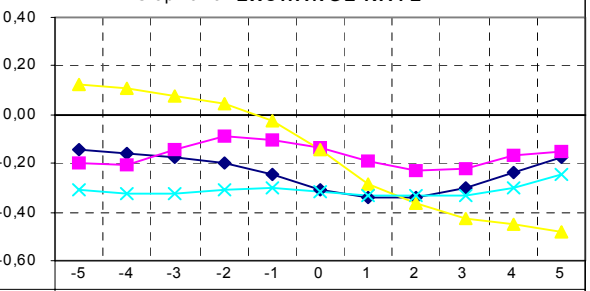
	-5	-4	-3	-1	0	1	2	4	5
SPN	-0,38	-0,38	-0,34	-0,12	0,00	0,08	0,14	0,23	0,23
FRA	-0,27	-0,40	-0,41	-0,17	-0,04	0,10	0,18	0,33	0,33
UK	-0,28	-0,28	-0,23	-0,04	0,06	0,10	0,19	0,25	0,17
USA	-0,41	-0,47	-0,51	-0,39	-0,24	-0,04	0,13	0,48	0,61
ITA	-0,59	-0,45	-0,25	0,23	0,34	0,35	0,30	0,08	0,03

Graphic 22: **TERMS OF TRADE**



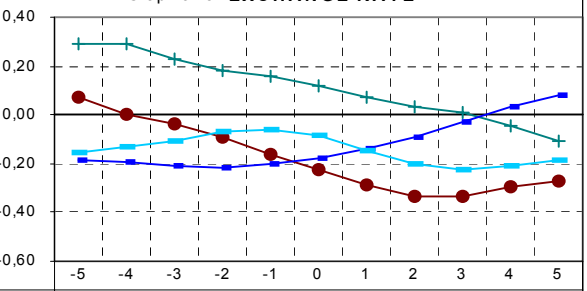
	-5	-4	-3	-1	0	1	2	4	5
GER	-0,30	-0,30	-0,24	-0,02	0,06	0,11	0,11	0,11	0,09
CAN	0,40	0,28	0,14	-0,08	-0,14	-0,20	-0,19	-0,19	-0,17
JPN	-0,34	-0,38	-0,39	-0,25	-0,17	-0,01	0,13	0,36	0,42
SUI	-0,31	-0,17	0,01	0,35	0,43	0,46	0,42	0,25	0,15

Graphic 23: **EXCHANGE RATE**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	-0,14	-0,16	-0,18	-0,20	-0,24	-0,31	-0,34	-0,34	-0,30	-0,24	-0,17
FRA	-0,20	-0,20	-0,15	-0,09	-0,10	-0,14	-0,19	-0,23	-0,22	-0,17	-0,15
UK	0,12	0,11	0,08	0,05	-0,02	-0,14	-0,28	-0,36	-0,43	-0,45	-0,48
ITA	-0,31	-0,33	-0,33	-0,31	-0,30	-0,32	-0,33	-0,33	-0,33	-0,30	-0,25

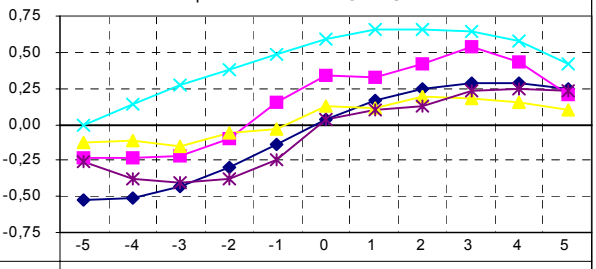
Graphic 23: **EXCHANGE RATE**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	0,07	0,00	-0,04	-0,09	-0,17	-0,22	-0,28	-0,34	-0,33	-0,30	-0,27
CAN	0,29	0,29	0,23	0,18	0,16	0,12	0,07	0,03	0,01	-0,04	-0,11
JPN	-0,19	-0,19	-0,21	-0,22	-0,20	-0,18	-0,14	-0,09	-0,03	0,03	0,08
SUI	-0,15	-0,13	-0,11	-0,07	-0,06	-0,08	-0,15	-0,20	-0,22	-0,21	-0,18

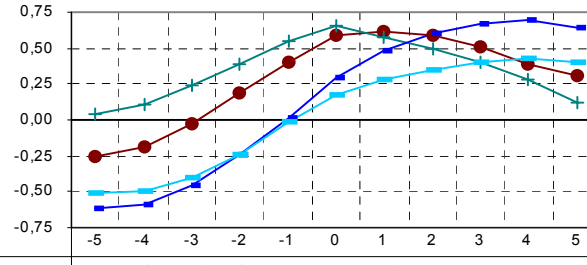
External variables. Cross-correlations with Terms of trade

Graph 24: **NET EXPORTS**



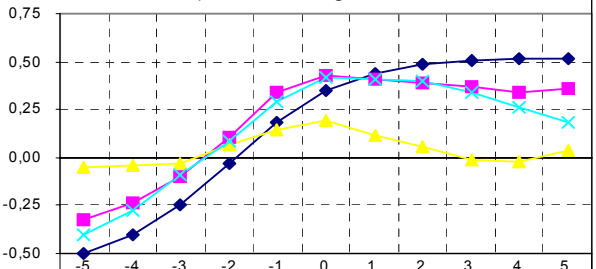
	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	-0,52	-0,51	-0,43	-0,30	-0,14	0,03	0,16	0,25	0,28	0,28	0,24
FRA	-0,23	-0,23	-0,22	-0,10	0,16	0,34	0,32	0,42	0,54	0,43	0,21
UK	-0,13	-0,11	-0,15	-0,06	-0,04	0,13	0,12	0,20	0,19	0,15	0,10
USA	-0,01	0,14	0,28	0,38	0,49	0,60	0,66	0,66	0,64	0,57	0,42
ITA	-0,26	-0,38	-0,40	-0,37	-0,24	0,04	0,10	0,12	0,23	0,24	0,23

Graph 24: **NET EXPORTS**



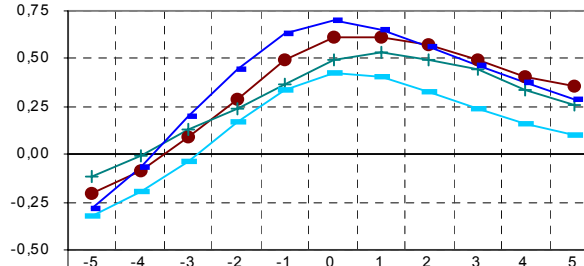
	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	-0,26	-0,19	-0,02	0,19	0,40	0,59	0,62	0,58	0,50	0,39	0,31
CAN	0,04	0,11	0,24	0,39	0,55	0,65	0,58	0,49	0,40	0,28	0,12
JPN	-0,61	-0,58	-0,46	-0,24	0,02	0,30	0,48	0,61	0,67	0,69	0,64
SUI	-0,51	-0,49	-0,40	-0,24	-0,01	0,18	0,27	0,34	0,40	0,42	0,40

Graph 25: **Exchange rate**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
SPN	-0,50	-0,40	-0,24	-0,04	0,18	0,35	0,44	0,48	0,50	0,51	0,51
FRA	-0,32	-0,24	-0,10	0,11	0,34	0,42	0,40	0,39	0,37	0,34	0,36
UK	-0,05	-0,04	-0,03	0,07	0,15	0,20	0,12	0,06	-0,01	-0,02	0,03
ITA	-0,40	-0,27	-0,09	0,09	0,29	0,42	0,41	0,40	0,34	0,26	0,19

Graph 25: **Exchange rate**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
GER	-0,21	-0,08	0,09	0,28	0,49	0,61	0,62	0,57	0,49	0,41	0,36
CAN	-0,12	-0,01	0,13	0,24	0,37	0,49	0,53	0,50	0,45	0,33	0,25
JPN	-0,28	-0,06	0,20	0,44	0,63	0,70	0,65	0,56	0,46	0,37	0,28
SUI	-0,32	-0,20	-0,03	0,17	0,34	0,42	0,41	0,33	0,24	0,16	0,10

exchange rates is really similar (also for the three filters) in all countries, except Canada, which has a different behaviour in its exchange rate and terms of trade; probably due to its geographic and economic proximity to the USA.

The relationship between terms of trade and net exports has been analysed in many papers which looked at the existence of the famous S-curve, that says that a future commercial surplus is related to today's gains in competitiveness, and gains in competitiveness are related with past commercial deficits.

As we can see in Graph 24, the existence of the S-curve is corroborated by our study, but the contemporary correlations are usually positive, mainly in the USA, Canada and Germany, where they are clearly positive. These results contradict the conventional wisdom that says that contemporary correlation should be negative because an improvement in the terms of trade implies an immediate rise in import prices, however, this result has also been obtained in Blackburn and Ravn (1992).

The relationship between exchange rates and terms of trade, illustrated in Graph 25, is also similar for all the countries: exchange rates and terms of trade move in the same way. That is what it is expected as a depreciation has the immediate effect of decreasing imports, or alternatively, before a deterioration in the terms of trade, monetary authorities react by devaluing the currency.

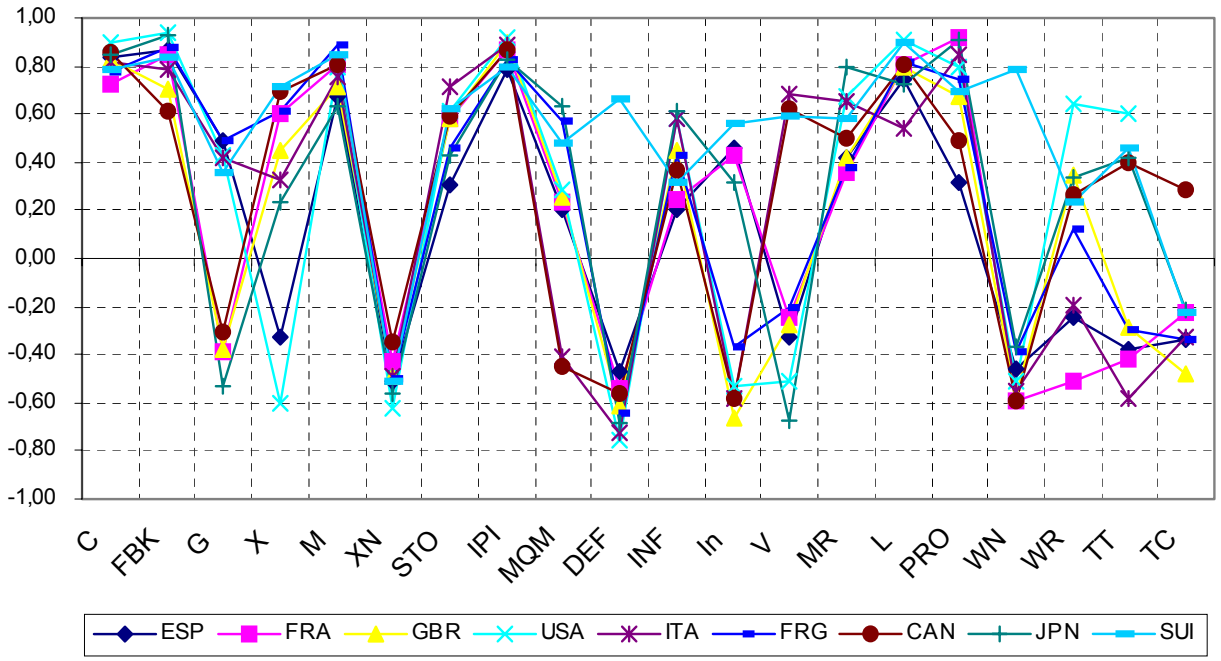
3.2) Are stylised facts similar among countries?

In this subsection we summarise the results obtained in previous sections. The objective is to give a rapid vision of how similar are cyclical stylised facts among countries. Keeping this objective in mind we will present part of the previous results in four graphs.

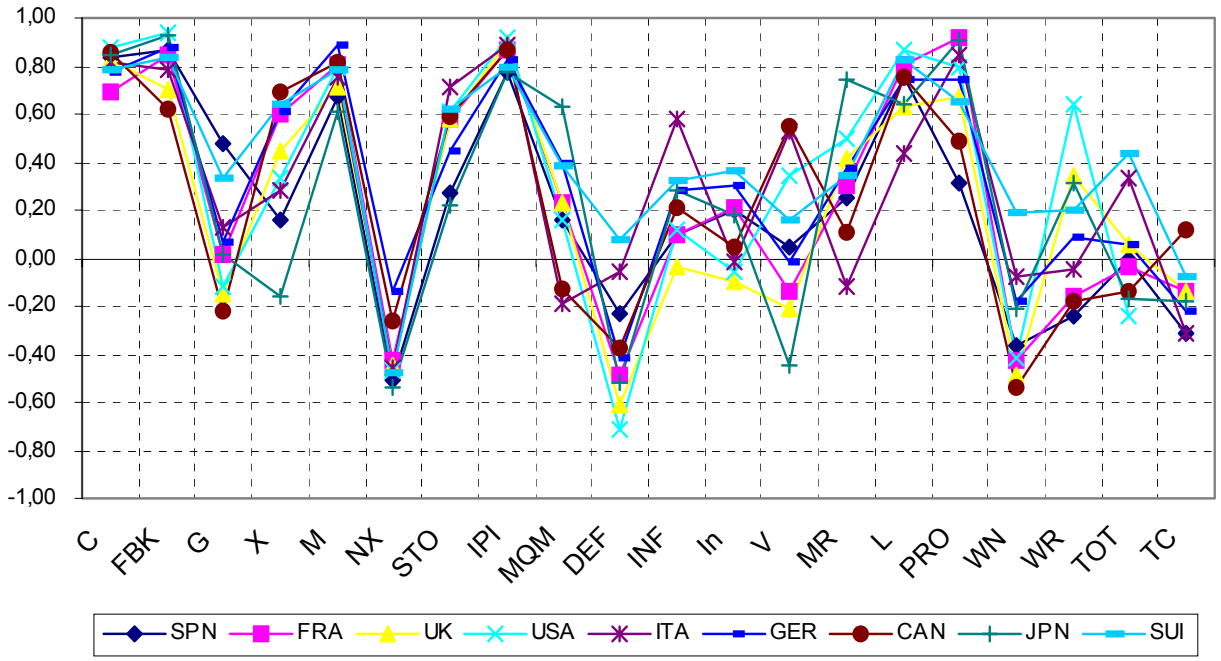
The first graph contains the maximum correlations of each variable with the GDP, the second one presents the contemporary correlations, third graph will show the absolute volatility of each variable and each country, and finally fourth graph shows the relative volatilities to the GDP. The same graphs for BK and first difference filters can be seen in the appendix. These graphs provide a rapid idea, although in some cases incomplete, of what variables have a similar cyclical behaviour among countries.

As it can be appreciated in the following graphs the cyclical properties of the different variables among countries are surprisingly similar for the real variables, with

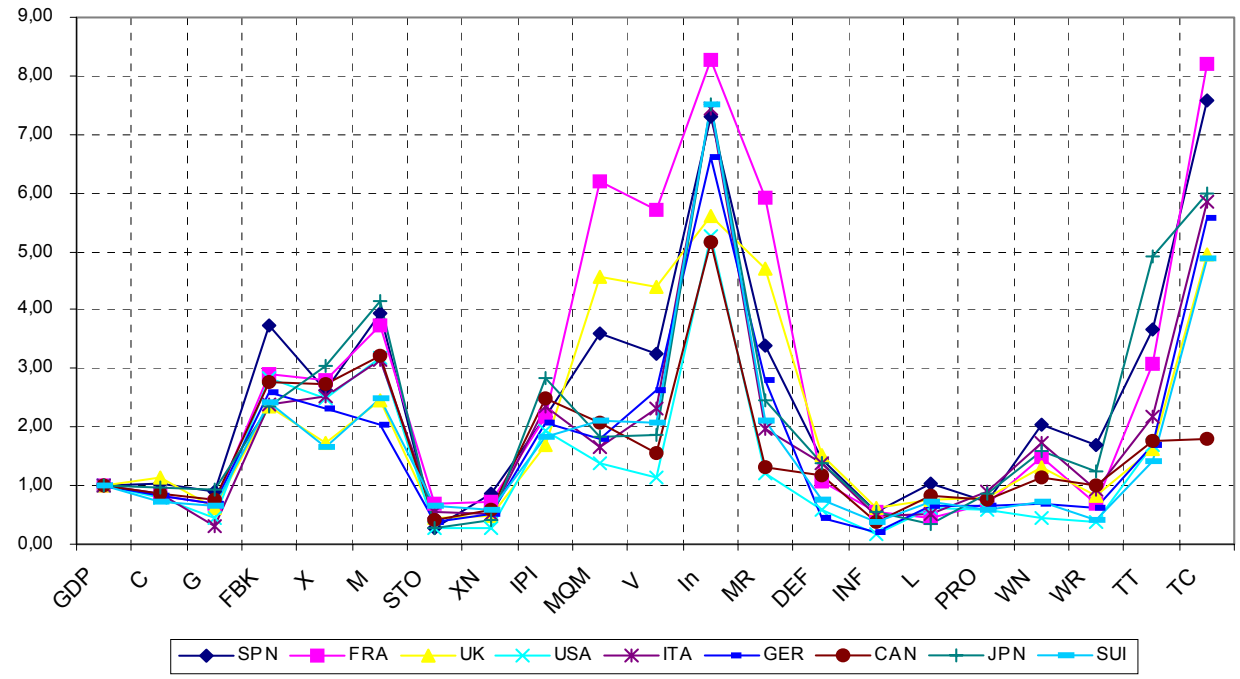
Graph 26: **Maximum correlations with GDP (HP filter)**



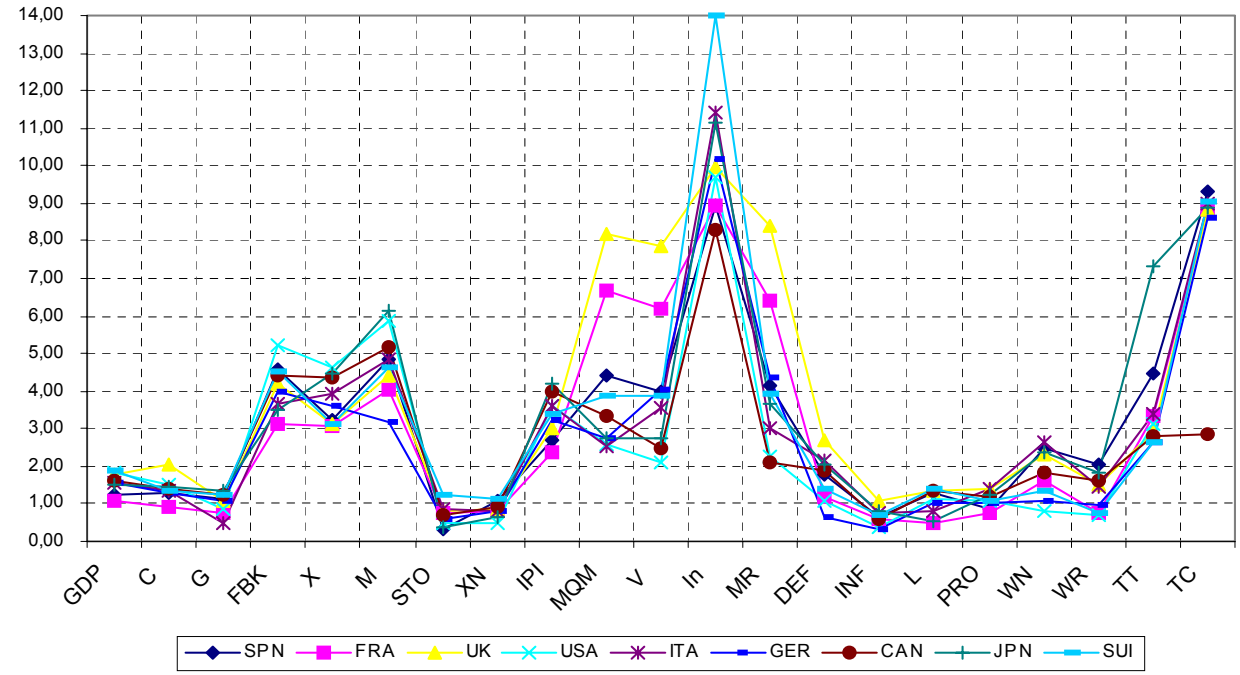
Graph 27: **Contemporary correlations with GDP (HP filter)**



Graph 27: **Standard deviations relative to GDP (HP filter)**



Graph 28: **Absolute standard deviations (HP filter)**



the exception of public consumption, and Japanese exports. Similarities are smaller in the nominal variables, but prices, inflation and nominal rates show a similar cyclical behaviour. Labour market variables also present a high degree of cyclical similarity, with the single exception of real wages.

Third and fourth graphs make evident that the ordination, for each country, of the volatilities of the different variables, is surprisingly similar among countries, indicating that the business cycles are a similar phenomena in the nine countries analysed. The high degree of similitude showed by the cross-correlations and by the volatilities among the different variables seem to indicate that the same economic mechanisms are present in the business cycle of the different economies.

4. Are stylised facts robust to the filter method?

After the study of Canova (1998), where it is studied the robustness of the cyclical stylised facts to twelve alternative filter methods, for the American economy, it seems clear that they are not robust to the election of the filter method. This result seems logical since different filters emphasise different frequencies of the series and, logically, there is no reason why the properties associated to different frequencies had to be identical.

Canova (1998) criticises that empirical studies use only one filter to characterise the stylised facts. The idea is that every filter method generates different economic objects, which have potentially different properties. Therefore, the use of a single filter cannot characterise the economic cycles accurately.

The study of Canova should be completed for other countries, to determine if, in spite of the different results obtained with alternative filters; these differences follow a similar pattern among countries. If this results is obtained, then it would mean that business cycles is a complex phenomena that probably is impossible to characterise with a unique filter, but is fundamentally similar among countries.

To analyse twenty-one variables for nine countries with a large number of filters would produce a huge number of results. Therefore, we only analyse the robustness of the stylised facts for the three filters used in this paper: HP, BK and first difference filter.

The results obtained with HP and BK filters are fundamentally similar. It should be no strange if one keeps in mind that the properties of these two filters are similar, referring to their capacity to isolate certain frequencies of the series.

With these two filters, the structures of correlations remain stable for all the variables analysed, showing that their cyclical properties do not change at least qualitatively. The differences between the contemporary correlations and the maximum correlations obtained with these two filters are practically never superior at 0.2. The usual thing is to obtain differences under 0.1.

The differences in the correlations obtained are greater for the HP and first difference filter. First difference filter amplifies the high frequencies of the different series, then the cycles generated by this filter have less duration and therefore they present a smaller persistence.

To make a comparison between the cyclical properties obtained with HP and first difference filter is more complicated than between HP and BK filters. The reason is that with first difference filter, we obtain cycles with very short duration; then it does not make sense to calculate a correlation window as wide as that of the HP or BK filters, where cycles present a higher duration. Nevertheless, in Table 11, we show the difference between the contemporary correlations obtained with these two filters.

Quantitatively it seems clear that contemporary correlations are different for these two filters. However, for the majority of the variables, mainly for real variables, the cyclical properties remain stable qualitatively, that is, the classification as procyclical or countercyclical do not change with the filter method. Additionally, if some country displays, with the HP filter, a different behaviour from the rest of countries for some variable, then this different behaviour is also showed with first difference filter. For example, exports in Japan are, with both filters, countercyclical, while the rest of countries have procyclical exports, also for both filters.

We can see in Table 11, that changes in the sign of the correlations are practically non-existent for the real variables. The nominal and real wages are the variables that show a stronger variation in their correlation with GDP cycle, between the two filters. This result indicates a different behaviour in the high frequencies relative to GDP, of these two variables.

TABLE 11: *Difference between contemporary correlations for HP and first difference cycles*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
REAL VARIABLES									
C	0.00	-0.15	-0.13	-0.20	-0.17	-0.13	-0.24	-0.07	-0.17
G	0.07	0.17	0.25*	0.08	0.02	0.14	0.31*	0.25	-0.04
FBK	-0.07	-0.24	-0.36	-0.16	-0.13	-0.14	-0.14	-0.12	-0.29
X	0.01	-0.24	-0.02	0.00	-0.08	0.00	-0.13	-0.18	-0.03
M	-0.08	-0.19	-0.39	-0.34	-0.40	-0.17	-0.23	-0.26	-0.08
STO	0.10	-0.10	-0.23	-0.04	-0.13	-0.20	-0.25	-0.44*	-0.16
XN	0.07	0.18	0.57*	0.27	0.31	0.19*	0.27*	0.32	0.23
IPI	-0.29	-0.11	-0.12	-0.14	-0.33	-0.31	-0.10	-0.33	-0.34
PRICES AND MONETARY VARIABLES									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
MQM	-0.04	-0.05	-0.16	-0.06	0.27*	-0.24	0.23*	-0.42	-0.18
MR	-0.02	-0.20	-0.29	-0.40	0.08	-0.30	-0.04	-0.52	-0.15
V	-0.09	0.17	0.29*	0.12	-0.14	0.10	-0.12	0.56*	-0.06
IN	-0.13	0.01	0.09	0.26	0.12	-0.08	0.14	-0.09	-0.01
DEF	0.01	0.49*	0.33	0.50	0.26*	0.27	0.31	0.37	0.01
INF	-0.16*	-0.11	-0.02	-0.05	-0.29	-0.26	-0.37*	-0.27	-0.14
LABOUR MARKET									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
L	-0.16	-0.29	-0.21	-0.22	-0.17	-0.28	-0.14	-0.32	-0.31
Pro	0.15	0.01	0.20	-0.07	-0.08	0.07	-0.03	-0.14	-0.06
WN	0.29	0.48*	0.61*	0.44*	0.25*	0.20*	0.56*	0.35*	-0.14
WR	0.27*	0.25*	0.05	-0.34	0.12*	-0.01	0.26*	-0.08	-0.24*
EXTERNAL VARIABLES									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
TT	0.06	0.10	0.09	0.12	-0.08	0.03	0.10	-0.05	-0.13
TC	0.04	0.11	0.14	-	0.26	0.20	-0.18*	0.07	0.18

* Each row shows the differences between the contemporary correlations for a variable. Therefore a –0.13 indicates that the variable are more correlated with GDP if we use HP filter than if we use first difference filter, while a 0.13 will indicate that the correlation is greater with (1-L). The variables marked with * change its sign when filter method is changed.

The relative volatility of a variable can change for both reasons: firstly the change can be due to a variation in standard deviation of the GDP or it can change due to a variation in standard deviation of the variable analysed. Then it seems more appropriate, to analyse if the filter method affects the volatilities of the different variables, to use the standard deviations of the variables rather than the relatives to GDP.

TABLE 12: *Differences in absolute volatilities for the different filters: HP, BK and (1-L)*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
REAL VARIABLES									
PIB	0.00	-0.05	-0.03	-0.01	0.01	-0.13	0.02	-0.19	0.02
	-0.46	-0.37	-0.35	-0.46	-0.42	-0.47	-0.38	-0.39	-0.55
C	0.00	-0.04	-0.07	-0.06	-0.10	-0.16	0.01	-0.13	-0.18
	-0.42	-0.18	-0.35	-0.47	-0.52	-0.38	-0.24	-0.19	-0.43
G	-0.06	0.01	-0.13	-0.04	-0.19	-0.06	-0.29	-0.02	-0.25
	-0.41	-0.23	-0.05	-0.12	-0.33	-0.26	0.04	0.01	-0.24
FBK	-0.09	-0.06	0.05	-0.02	-0.13	-0.20	0.03	-0.10	-0.09
	-0.55	-0.49	-0.29	-0.53	-0.50	-0.51	-0.43	-0.42	-0.51
X	-0.06	-0.11	-0.21	-0.07	-0.12	-0.12	-0.06	0.05	0.12
	-0.53	-0.05	0.18	-0.32	0.02	-0.31	-0.24	-0.30	-0.49
M	-0.07	-0.02	-0.01	-0.03	-0.09	-0.21	0.04	0.02	0.03
	-0.50	-0.30	-0.22	-0.36	-0.18	-0.37	-0.35	-0.42	-0.55
STO	0.10	-0.12	-0.12	-0.09	-0.03	-0.11	-0.10	-0.37	0.04
	-0.50	0.02	-0.06	0.03	-0.09	-0.13	0.03	0.19	-0.34
XN	-0.08	-0.01	-0.09	-0.09	-0.25	-0.00	-0.01	0.05	0.02
	-0.53	-0.17	-0.10	-0.47	-0.19	-0.29	-0.18	-0.43	-0.45
IPI	-0.14	0.00	-0.04	0.02	0.01	-0.15	0.05	0.02	-0.04
	-0.14	-0.36	-0.27	-0.49	-0.24	-0.15	-0.51	-0.53	-0.17
PRICES AND MONETARY VARIABLES									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
MQM	-0.15	-0.09	-0.05	-0.48	-0.05	-0.02	-0.21	-0.33	-0.21
	0.00	0.04	-0.19	0.37	-0.04	-0.46	0.00	0.24	0.08
MR	-0.04	-0.01	0.05	-0.06	0.05	-0.26	-0.03	-0.22	-0.02
	-0.18	-0.24	-0.30	-0.29	-0.25	0.22	-0.14	-0.28	-0.26
V	-0.03	-0.01	0.04	-0.09	0.04	-0.36	0.08	-0.30	-0.02
	-0.18	-0.21	-0.25	-0.14	-0.30	0.31	-0.20	-0.05	-0.25
IN	-0.05	-0.08	-0.13	-0.02	-0.06	-0.06	-0.05	-0.12	-0.03
	-0.32	-0.42	-0.29	-0.35	-0.43	-0.49	-0.31	-0.22	-0.53
DEF	0.03	0.03	0.12	0.03	-0.11	0.05	-0.14	-0.15	-0.06
	-0.28	-0.13	-0.43	-0.45	-0.35	-0.30	-0.50	-0.41	-0.40
INF	-0.16	-0.38	-0.15	-0.14	-0.11	-0.30	-0.20	-0.06	-0.40
	0.14	0.35	0.16	-0.04	-0.05	0.31	0.17	-0.00	0.37
LABOUR MARKET									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
L	-0.09	-0.07	0.06	0.03	-0.38	-0.13	0.01	-0.16	-0.05
	-0.44	-0.53	-0.58	-0.54	-0.23	-0.54	-0.50	-0.23	-0.56
PRO	-0.14	-0.08	-0.04	-0.13	0.01	-0.03	-0.17	-0.28	-0.02
	-0.31	-0.19	-0.25	-0.19	-0.32	-0.28	-0.02	-0.21	-0.22
WN	-0.09	-0.02	0.02	0.18	-0.22	-0.24	-0.01	-0.26	0.05
	0.16	-0.18	-0.25	-0.02	-0.20	0.27	-0.31	0.17	-0.40
WR	-0.16	-0.14	-0.15	-0.09	-0.01	-0.39	-0.05	-0.46	0.04
	0.23	-0.00	0.12	-0.32	-0.01	0.30	-0.33	0.30	-0.04
EXTERNAL VARIABLES									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
TT	0.04	-0.05	-0.12	0.03	-0.11	0.04	-0.02	0.00	0.09
	-0.52	-0.26	-0.31	-0.38	-0.25	-0.49	-0.44	-0.44	-0.48
TC	0.01	0.04	-0.04	--	-0.01	0.04	-0.08	0.01	0.06
	-0.45	-0.43	-0.40	--	-0.43	-0.40	-0.44	-0.44	-0.37

***** For each variable, the first row shows the difference (in percent) between the absolute volatility of BK and HP cycles. The second row shows the difference in the volatilities (in percent) of HP and first difference cycles. For example, 0.25 in the first row will show that the BK cycle is 25% more volatile than the HP cycle. The percentages were always calculated relative to HP cycles.

We can see in Table 12, that the differences in volatilities are stronger between HP and first difference filters than between HP and BK filters.

The absolute volatilities obtained with HP and BK filters usually show a difference between five and fifteen percent, very few cases reach over twenty percent. A curious result is that there are not variables for which the volatility moves in the same direction for all the countries.

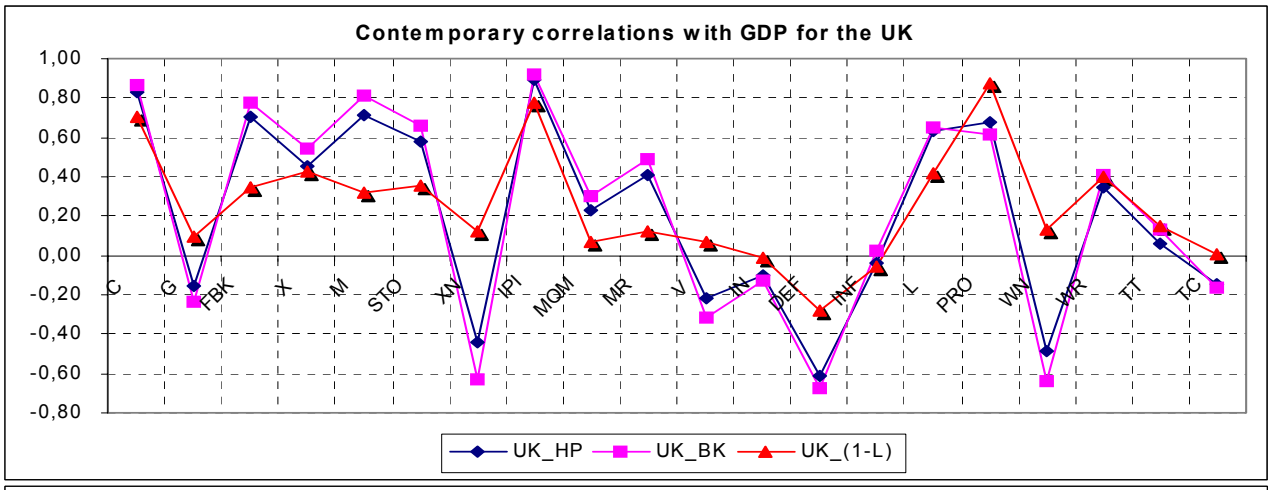
The differences between absolute volatilities obtained with HP and first difference filter are clearly bigger than between BK and HP filters. Generally, volatilities obtained with first difference filter are between a twenty and fifty percent lower than with HP filter. Also, the variables show uniform behaviour among countries, with the exceptions of nominal money, stocks, and nominal and real wages.

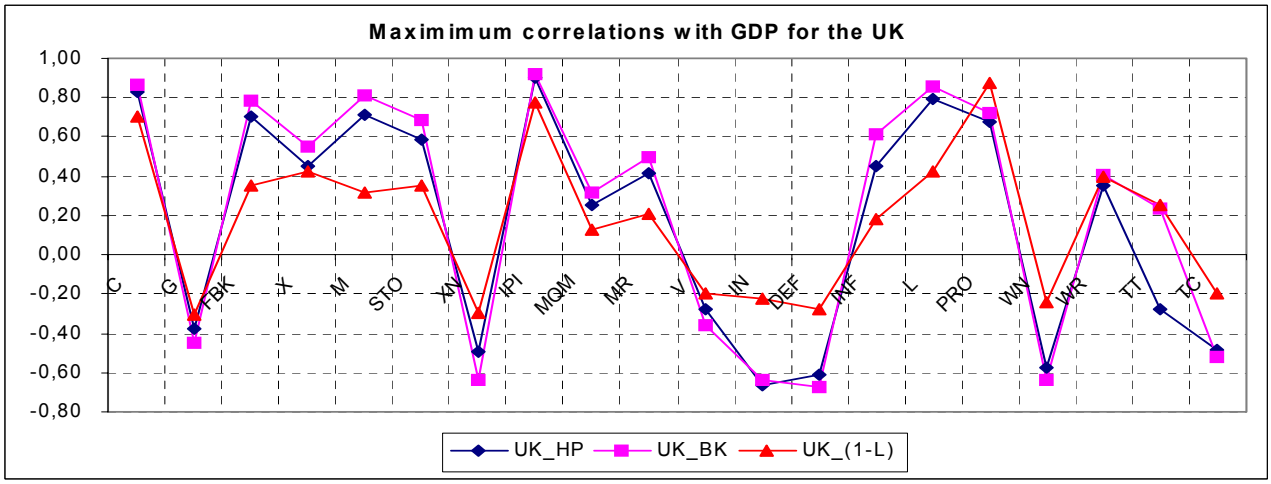
The fact, that the differences in absolute volatilities between these two filters are in many cases greater than fifty percent, seems to indicate that different filters provide very different results. However, as we will show in the following graphs, the three filters maintain the relative ordination (for each country) of the volatilities for the different variables.

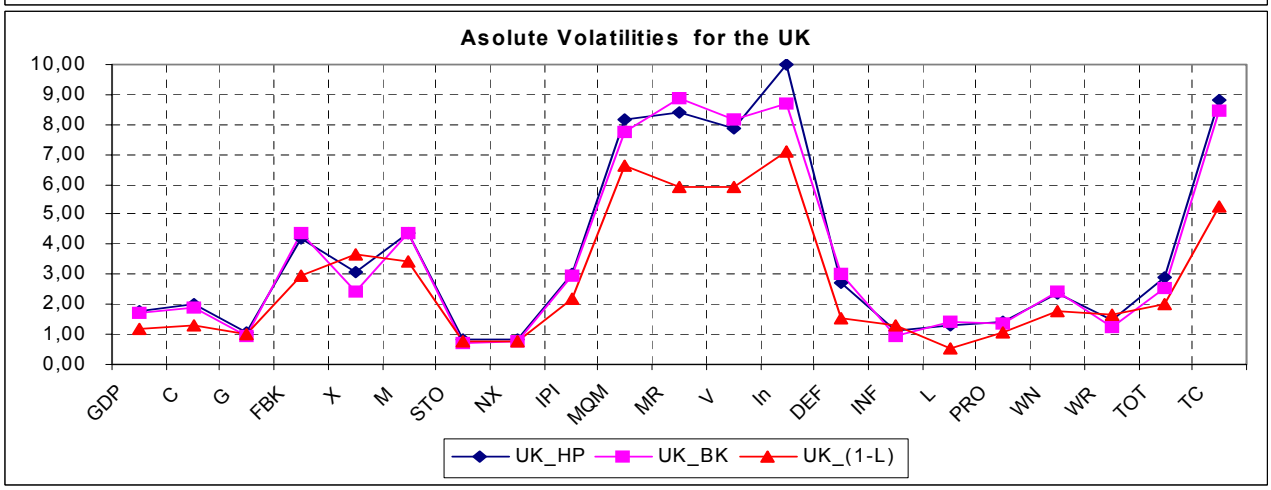
These graphs show that, although it is true that each filter give us different magnitudes for the volatilities, they also seem to show that, at least for the three filters analysed, they affect to the different variables in a similar way. Nevertheless, it continues to be true that the use of several filters can provide a more complete description of the cyclical characteristics of the different variables. If we know the properties of the filters, the use of several filters can help to discover different characteristics of the variables that the use of a single filter can mask.

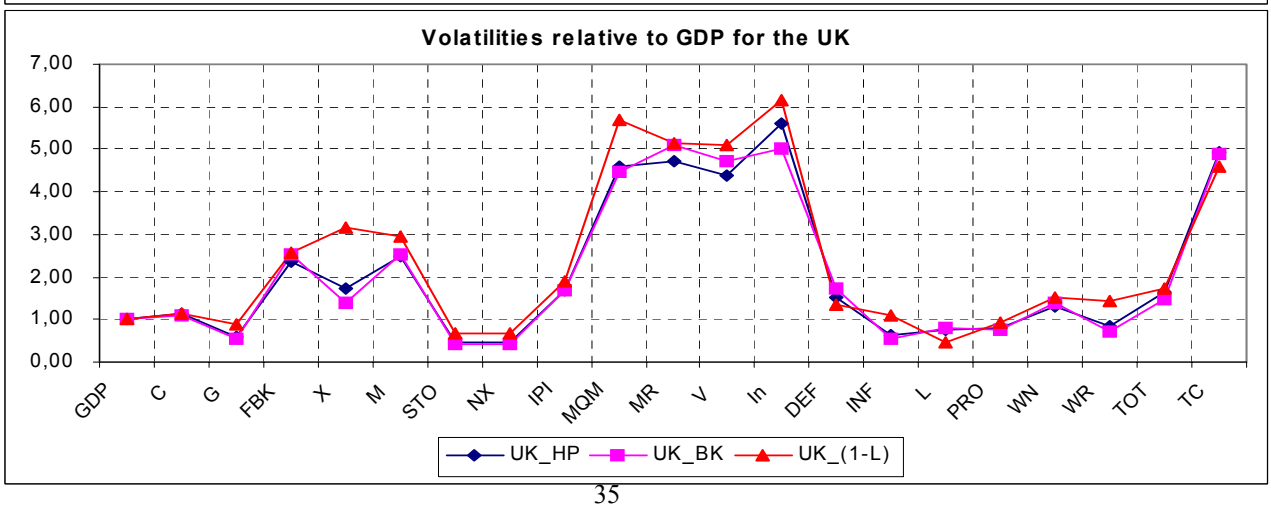
The same argument applies to the correlations, but the following two graphs show that although for certain variables each filter can give us a different measure of co-movement with the GDP, generally, the results are qualitatively similar, at least for the three filters analysed. To save space we will only present graphs for the USA and the UK, but similar results were obtained for the rest of countries.

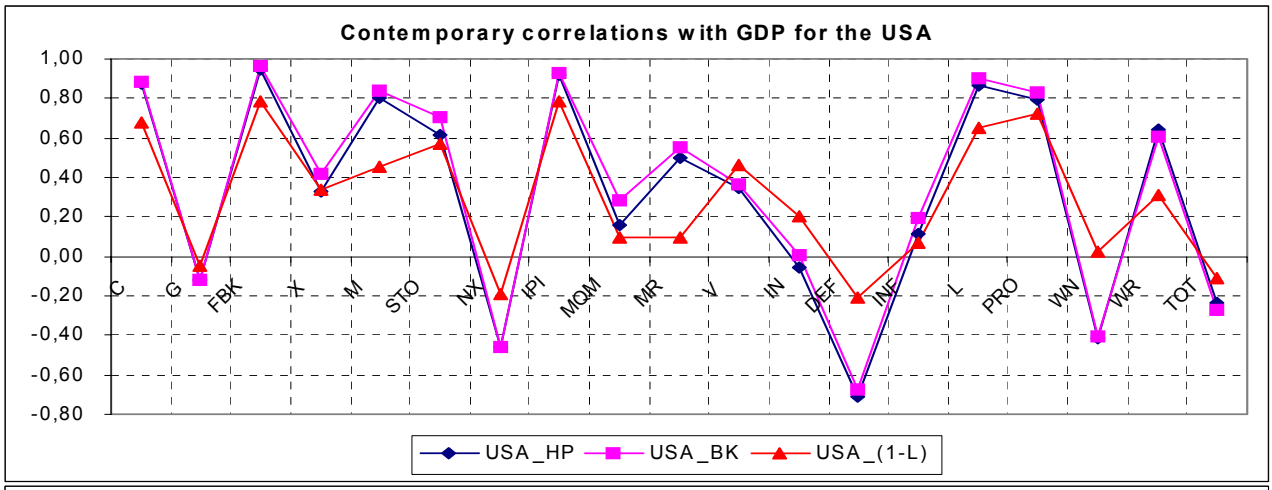
Then, the general impression is that, although each filter provides different quantitative results, they do not change drastically the relative cyclical properties of the variables of each country. That is, the results are qualitatively stable, although certainly the argument of Canova (1998) makes sense; to use several filters helps to better characterise the cyclical properties of the variables.

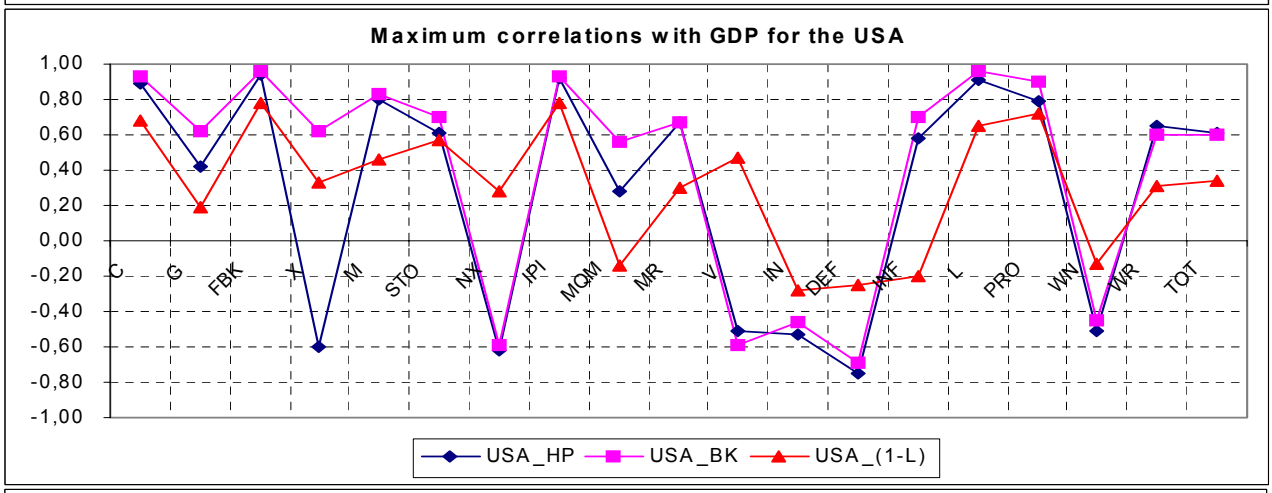

Contemporary correlations with GDP for the UK
1,00
0,80
0,60
0,40
0,20
0,00
-0,20
-0,40
-0,60
-0,80
C
G
FBK
X
M
STO
XN
IPI
MQM
MR
V
IN
DEF
INF
L
PRO
WN
WR
TT
TC
UK_HP
UK_BK
UK_(1-L)

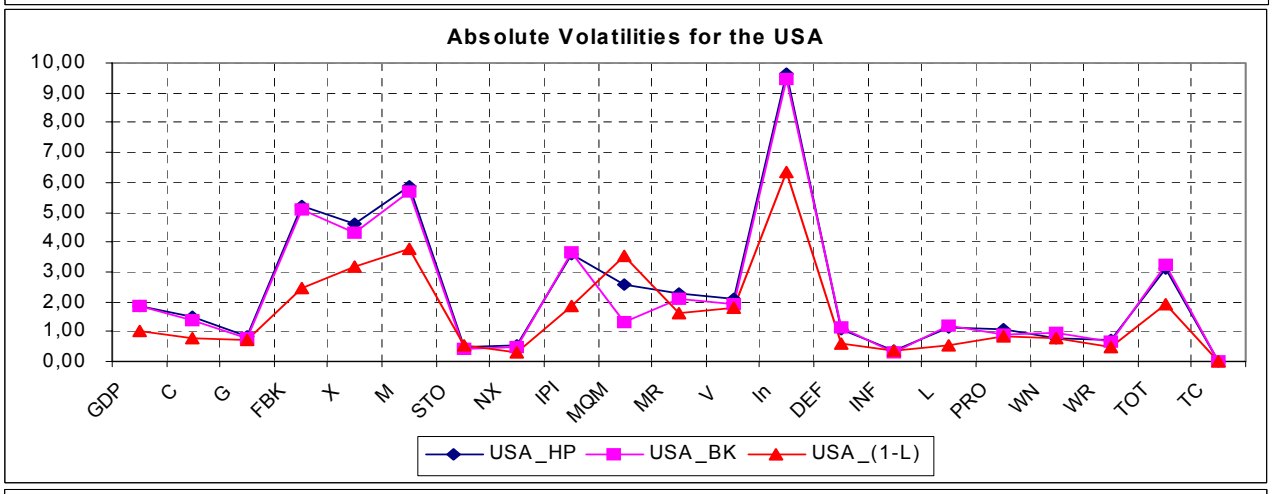

Maximimum correlations with GDP for the UK
1,00
0,80
0,60
0,40
0,20
0,00
-0,20
-0,40
-0,60
-0,80
C
G
FBK
X
M
STO
XN
IPI
MQM
MR
V
IN
DEF
INF
L
PRO
WN
WR
TT
TC
UK_HP
UK_BK
UK_(1-L)

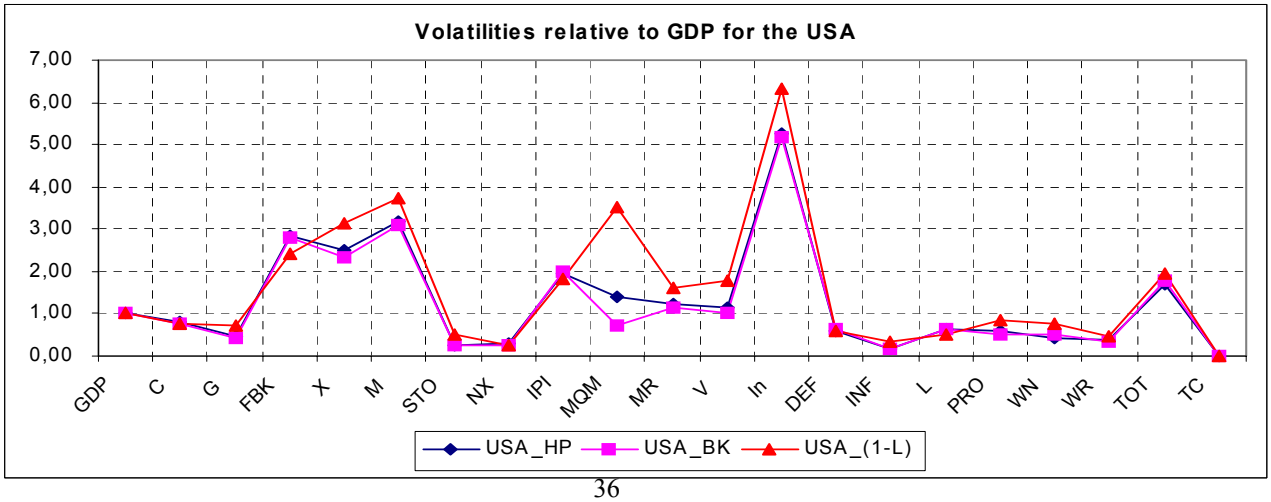

Asolute Volatilities for the UK
10,00
9,00
8,00
7,00
6,00
5,00
4,00
3,00
2,00
1,00
0,00
GDP
C
G
FBK
X
M
STO
NX
IPI
MQM
MR
V
In
DEF
INF
L
PRO
WN
WR
TOT
TC
UK_HP
UK_BK
UK_(1-L)


Volatilities relative to GDP for the UK
7,00
6,00
5,00
4,00
3,00
2,00
1,00
0,00
GDP
C
G
FBK
X
M
STO
NX
IPI
MQM
MR
V
In
DEF
INF
L
PRO
WN
WR
TOT
TC
UK_HP
UK_BK
UK_(1-L)


Contemporary correlations with GDP for the USA
1,00
0,80
0,60
0,40
0,20
0,00
-0,20
-0,40
-0,60
-0,80
C
G
FBK
X
M
STO
NX
IPI
MQM
MR
V
IN
DEF
INF
L
PRO
WN
WR
TOT
USA_HP
USA_BK
USA_(1-L)


Maximum correlations with GDP for the USA
1,00
0,80
0,60
0,40
0,20
0,00
-0,20
-0,40
-0,60
-0,80
-1,00
C
G
FBK
X
M
STO
NX
IPI
MQM
MR
V
IN
DEF
INF
L
PRO
WN
WR
TOT
USA_HP
USA_BK
USA_(1-L)


Absolute Volatilities for the USA
10,00
9,00
8,00
7,00
6,00
5,00
4,00
3,00
2,00
1,00
0,00
GDP
C
G
FBK
X
M
STO
NX
IPI
MQM
MR
V
In
DEF
INF
L
PRO
WN
WR
TOT
TC
USA_HP
USA_BK
USA_(1-L)


Volatilities relative to GDP for the USA
7,00
6,00
5,00
4,00
3,00
2,00
1,00
0,00
GDP
C
G
FBK
X
M
STO
NX
IPI
MQM
MR
V
In
DEF
INF
L
PRO
WN
WR
TOT
TC
USA_HP
USA_BK
USA_(1-L)

5. Temporal stability of the stylised facts.

In this section we will analyse the temporal stability of the results obtained in previous sections. It is possible that they were the result of a temporal aggregation, hiding big differences in cyclical properties for different sub-samples. Then, instead of computing the correlations and standard deviations for the whole sample, we re-compute them using the rolling technique; that is, we will calculate them for a fixed sample length, which is shifted through the whole sample period. This method has advantages relative to the standard approach of dividing the sample in different sub-samples. The researcher does not have to decide how to divide the sample and also it provides a more complete vision of how the moments evolve through time. Logically, this more complete characterisation has a cost: the volume of results increases enormously. To give an example of this problem, we only need to say that to characterise completely the temporal evolution of the correlation structures for a single variable, given the sample period, 84 graphs would be needed if the temporal window were of five years.

To present so many graphs is not feasible, then we decided to present only, for some variables, the graph with the contemporary correlation, that in many cases, mainly in real variables, gives a good decryption of the whole set of results. Additionally, the results will only be presented for the HP filter.

It is also necessary to say that the analysis made in this section has been carried out in a different way to the other sections. We do not try to completely characterise the temporal evolution of all the variables. Instead, we only want to give a general impression of how stable the stylised facts are through time; and to determine if there exist some temporal patterns that could be rationalised. In this section certain questions or conjectures about the possible temporal evolution of the cyclical characteristics will guide the empirical analysis; that is, the approach is more deductive than in the previous sections.

Among the possible questions that we could analyse we have chosen three. Firstly a very general question: are the stylised facts obtained in previous sections stable through time? Secondly, are there periods where a same variable for all the countries, increases or decreases its association with the GDP? An affirmative answer to this question could be indicative that some economic event affected all countries at the same time. And finally,

does a group of variables, for a single country, present similar temporal patterns in their variability or cross-correlation with GDP?

Before answering these questions it is necessary to say that the different moments are more stable when the temporal window is wider. Following Blackburn and Ravn (1992) we will use a temporary window of five years to calculate the rolling moments. But to answer the first question, we will use a temporal window of ten years. The reason for this, when we decide if the stylised facts are stable or not, is that with a window of five years almost all the variables present in some period wide differences in their correlations, in general superior to 0.4. However, most of these wide differences only take place in a short period of time, and we are looking for more steady or persistent temporal instabilities in the cyclical properties, rather than for punctual ones.

The results show that, with the exception of some few variables and only for certain countries, the relationship of the variables with GDP, measured by the structure of its correlations, are fundamentally stable over time. Understanding by fundamentally stable a situation in which for the majority of periods the correlations show the same structure, although the exact magnitudes of the single correlations could, sometimes, vary significantly. This result is similar to the one obtained for the UK in Blackburn and Ravn (1992). These authors conclude that, although most of the cross-correlations present certain quantitative instability, they also show qualitative stability, which is understood to mean the maintenance of the sign in the contemporary cross-correlation with the GDP.

This qualitative stability increases when one focuses on the whole set of correlations, instead of the contemporary one. Then, the general impression is that the structure of the different sets of correlations shows a high degree of temporal stability, although it could move up and down, indicating a bigger or smaller association with the GDP, but the form of this relationship shown in the graph of the set of correlations usually remains stable over time.

For the variables that present an inverted U-shaped curve in their correlations, like the real variables, it is possible to summarise its temporal evolution of his relationship with GDP, using only the contemporary correlation. Therefore, we will show in Table 13 the highest and lowest contemporary correlation obtained with a rolling temporal window of ten years.

TABLE 13: *Contemporary correlations (the highest and the lowest) calculated with a rolling window of ten years (V=40)*.*

	ESP	FRA	GRB	USA	ITA	FRG	CAN	JPN	SUI
C	0.90	0.78	0.95	0.91	0.90	0.85	0.93	0.91	0.82
	0.43	0.56	0.70	0.81	0.78	0.61	0.59	0.55	0.39
FBK	0.95	0.91	0.80	0.97	0.87	0.93	0.77	0.96	0.87
	0.40	0.60	0.67	0.82	0.73	0.74	0.07	0.82	0.76
M	0.83	0.87	0.76	0.86	0.86	0.95	0.89	0.77	0.83
	0.01	0.65	0.62	0.59	0.56	0.82	0.68	0.56	0.52
X	0.57	0.71	0.67	0.54	0.40	0.86	0.80	0.42	0.69
	-0.43	0.10	0.15	0.20	-0.05	0.08	0.50	-0.50	0.43
STO	0.60	0.79	0.72	0.70	0.84	0.67	0.75	0.58	0.80
	-0.03	0.40	0.37	0.47	0.14	0.23	0.28	-0.01	0.40
IPI	0.84	0.94	0.93	0.96	0.95	0.92	0.92	0.87	0.87
	0.44	0.65	0.89	0.81	0.73	0.58	0.80	0.59	0.54
L	0.94	0.90	0.71	0.92	0.62	0.86	0.90	0.76	0.86
	0.49	0.65	0.60	0.80	0.27	0.47	0.35	0.22	0.68
PRO	0.88	0.97	0.85	0.84	0.94	0.79	0.64	0.93	0.76
	-0.57	0.85	0.33	0.67	0.60	0.53	0.27	0.81	0.11
G	0.76	0.54	0.02	0.13	0.40	0.60	-0.05	0.14	0.83
	0.04	-0.13	-0.45	-0.29	0.05	-0.13	-0.51	-0.27	-0.18

* HP filter (1970:2-1993:4). The first row of each variable shows the highest contemporary cross-correlation with GDP, calculated for a rolling temporal window of ten years., while the second row shows the lowest. V = 40, indicates that the temporal window has forty quarters, that is, ten years.

As we can see in Table 13, there are very few changes in the sign of the highest and the lowest contemporary correlations. Only exports in Spain and Japan, in a lesser degree the stocks, also in Spain and Japan, and the productivity in Spain. For the rest of real variables have periods when the cross-correlation with GDP falls significantly (mainly in Spain), but the structure of the set of cross-correlations stay stable over time. These results remain with the first difference filter and now they also present signs of instability the exports and the employment in Italy, and the employment in Japan.

Contrary to real variables, for the rest of variable we could not analyse their evolution over time by only focusing in the contemporary correlations. We should analyse the complete set of cross-correlations, but then we would need an enormous number of graphs. Therefore we have decided to make only a brief comment on the obtained results.

The general impression, once analysed the results, is that the relationship of most variables with the GDP remains stable. The structure of their correlations maintains the

same shape over time. Of course, as it happens with the real variables, the exact magnitude of the cross-correlations varies, and the graph of the correlations goes up and down, but maintaining the same correlation structures.

The objective is to give an idea of how stable are the cyclical properties, then we can say that only for some variables, and never for all the countries, they change their relationship with the GDP for certain sub-periods.

Looking at the temporal stability of the standard deviations, we can see in Table 14, that the difference between the highest and the lowest standard deviations, calculated for a rolling window of ten years, is between forty and sixty percent. Besides the magnitude of this difference, it is also necessary to say that, contrarily to the cross-correlations, the differences stay for long periods, that is not only for some specific years.

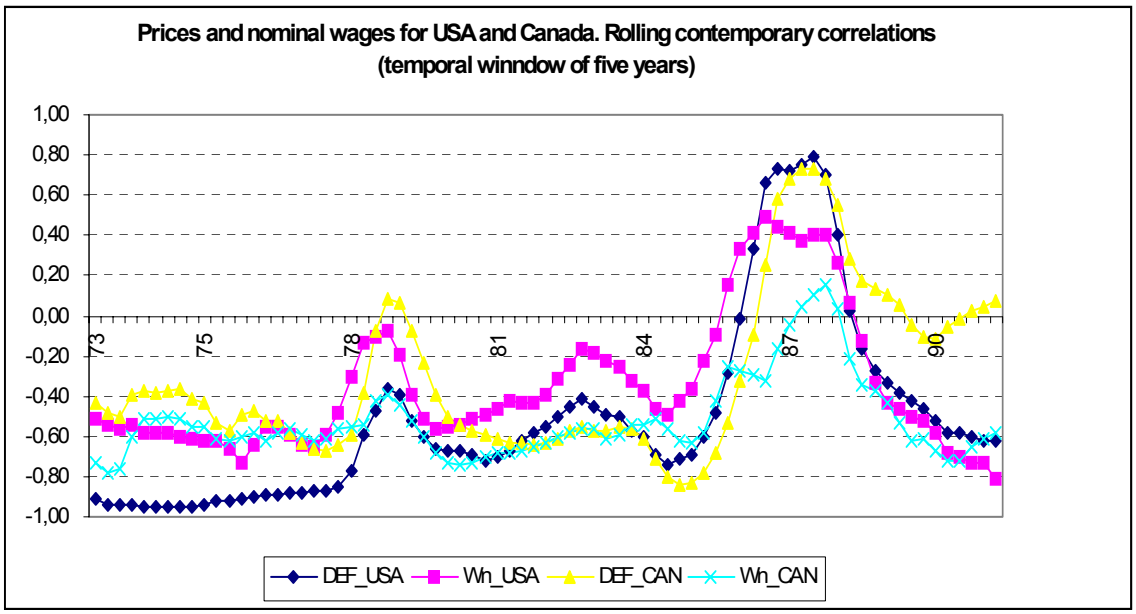
TABLE 14: *Difference (in percentage) between the highest and lowest volatility, calculated with a rolling temporal window of ten years*.*

	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
REAL VARIBLES									
PIB	54	34	35	60	58	50	48	59	63
C	47	25	26	55	41	40	46	56	71
G	42	21	49	42	46	27	37	51	49
FBK	52	23	46	56	43	51	56	46	61
X	51	23	58	47	35	36	50	26	50
M	21	48	34	61	48	39	60	29	66
STO	43	45	43	30	62	38	38	62	60
XN	36	16	26	36	42	39	41	34	32
IPI	55	50	54	66	60	27	46	55	46
PRICES AND MONETARY VARIABLES									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
MQM	54	67	65	17	60	68	32	44	42
MR	43	81	63	61	74	37	39	58	55
V	49	78	58	31	72	27	53	49	50
IN	36	25	38	43	30	35	34	29	37
DEF	59	51	71	58	59	28	50	79	57
INF	21	56	61	60	65	45	42	67	70
LABOUR MARKET									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
L	70	44	27	59	48	30	42	49	53
Pro	50	33	36	50	56	39	30	48	54
WN	60	44	72	49	56	37	56	66	60
WR	47	37	63	55	57	28	44	50	50
EXTERNAL VARIABLES									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
TT	45	40	66	59	39	27	56	32	33
TC	22	32	27	--	23	32	36	25	33

* HP filter (1970:2-1993:4). Percentages are calculated relative to the highest.

These two results indicate that the standard deviations are less stable than the correlation structures. For many variables (exports, imports, industrial production, prices, inflation, productivity, exchange rates, nominal wages and real wages) the volatility is greatest at the beginning of the sample period. This result, together to the fact than the correlations are stable for those variables, seems to indicate that they have the same relationship with GDP for periods of high and low volatility.

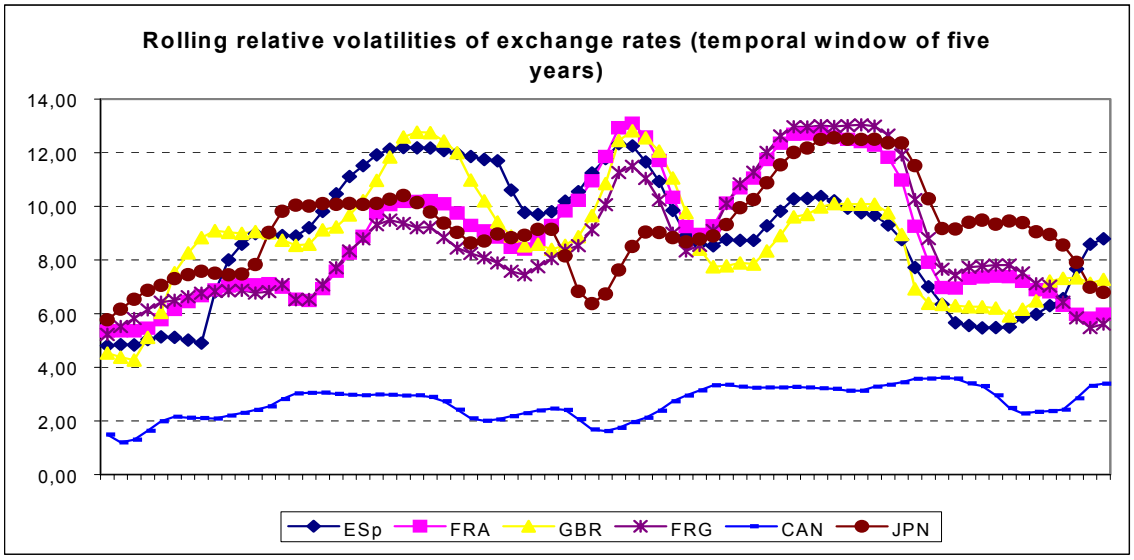
Referent to the second question, we only detected lax rules along time and not for all the countries. For example, in the last years of the sample period, it is found, in general, an increase in the cross-correlations of the real variables with GDP. It is also observed that some variables, mainly the nominal rates, nominal wages and prices, of Canada and the USA show a high synchronisation over time. In the next graph you can see the behaviour of prices and nominal wages in these two countries.



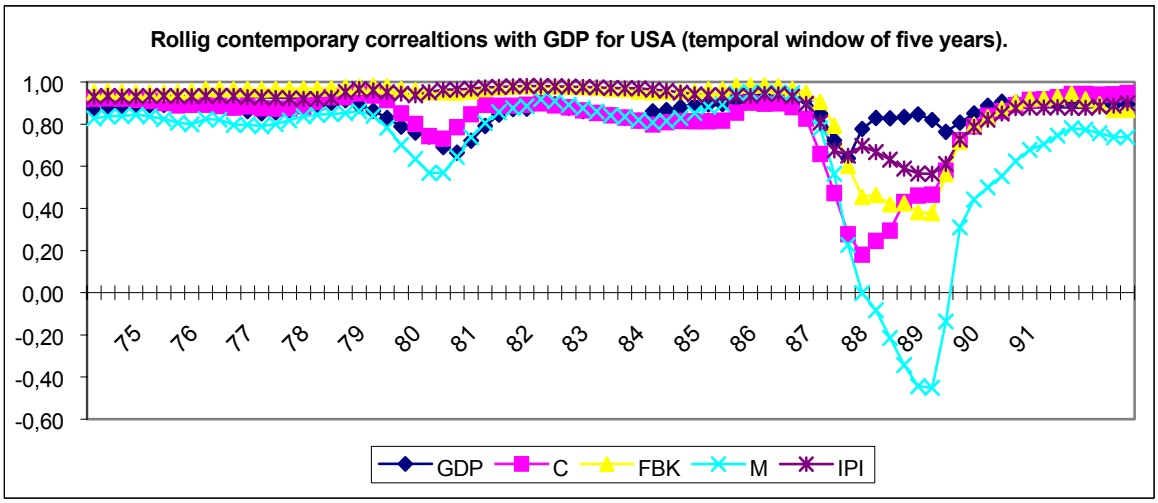
There are also many other synchronicities in some variables among countries, but always these synchronies are lax, that is, they do not exist for the whole sample and not for all countries. For example at the end of the sample, we observe a great similarity in the behaviour of nominal rates among the European countries, except for the UK. This result could be due to the leadership of the German monetary policy.

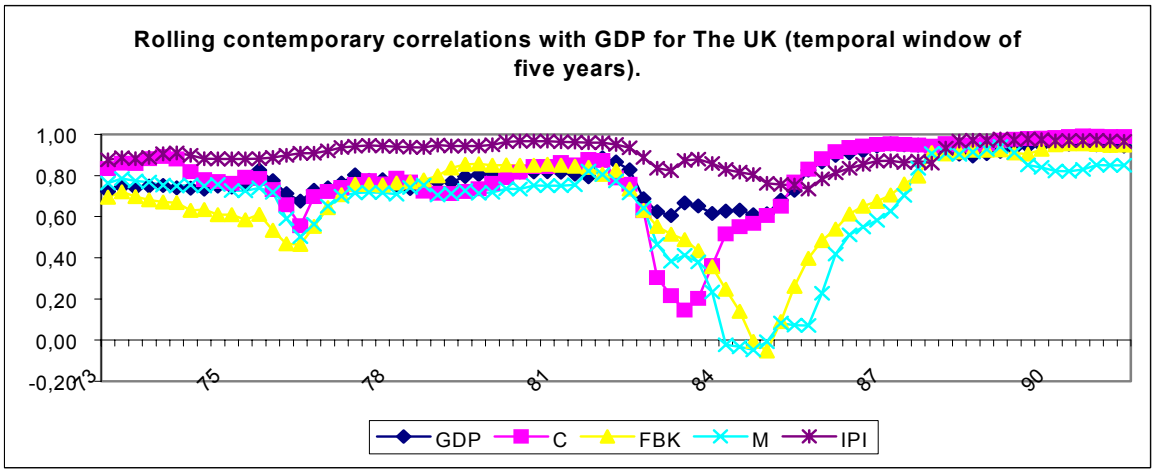
But the answer to the second question is negative; we did not find any variable with a clear synchrony in their cross-correlation with GDP among countries. We only detected similar temporal patterns for some countries and for some specific periods, but it is also true that, in certain cases the similarities are puzzling, like in some variables of Canada and the USA.

On the contrary, the standard deviations present higher synchronies among countries. Exchange rates and the terms of trade are the most evident cases, as we can see in the following graph. Also the nominal rates show a high temporal synchrony, mainly at the end of the sample period, possibly due to the internationalisation of financial markets.



The answer to the third question is affirmative. As we can see in the following two graphs, some common temporal patterns exist among the variables within a country. For example, we observe that the cross-correlation of the real variables with GDP increase o decrease at the same periods in all the countries. Typically, the cross-correlation of real variables with GDP falls in periods when the autocorrelation of the GDP also fall; but these periods are not coincidental among countries. Other variables that present similar temporal patterns in their correlations with the GDP are prices and nominal wages. This result confirms the huge similarity between these two variables found in previous sections.





6. Conclusions

In this paper we have empirically characterised the cyclical stylised facts of the main western economies in the period 1970:2-1993:4. To analyse if the stylised facts are robust to the filter method, we have used three different filters: HP, BK and first difference. We have also analysed the temporal stability of the cyclical properties using a rolling technique.

The main conclusion of this paper is the existence of a great similarity in the cyclical stylised facts among countries, fundamentally in the real variable. This result suggests that the business cycle is an international phenomenon, common to the western economies. This fact converts the business cycle in an important area of research and justifies looking for unified explanations.

The most important similarities among countries were found in the real variables. The unique exception to this uniform behaviour in real variable was that of public consumption. Private consumption, gross capital formation, exports, imports, stocks, and the industrial production index are procyclical, while net exports are countercyclical.

The monetary variables do not show as many similarities as the real ones. Since prices are countercyclical and that the real variables behave in a similar way in all the countries analysed, it seems to indicate that the role of the monetary policy has not been fundamental to explain the economic fluctuations in the period analysed.

Prices are countercyclical for all the countries, with the possible exception of Switzerland: this fact can be interpreted as meaning that supply shocks having played a fundamental role in economic fluctuations. Nevertheless, it is necessary to remember that Judd and Trehan (1995) show that you cannot reach conclusions about the nature of shocks by focusing only on the correlation between prices and GDP.

The labour markets also present wide similarities. For all the countries, productivity and employment are procyclical, while nominal wages are countercyclical. On the other hand, real wages do not present a uniform cyclical behaviour, indicating that possibly there exist differences in the functioning or in the regulation of the national labour markets.

The representative variables of the external sector also present the same cyclical properties. The exceptions are the differentiated behaviour of the exports in Japan and the exchange rates in Canada. The analysis also seems to indicate the existence of the S-curve for several countries.

The analysis made in the fourth section shows that, when we change the filter method, the results obtained can vary quantitatively, but it is also true that different filters do not change the relative properties drastically, that is, we can affirm that the results remain fundamentally stable for most of the variables, at least qualitatively. Two of the variables which show great differences when the filter is changed are nominal wages and in a lesser degree prices.

The results of this paper also indicate the existence of a high degree of stability in the stylised facts over time. This stability of the results is reinforced when we take into account the complete set of correlations instead of only the contemporary one. The standard deviations show greater instability than the cross-correlations. We have detected that many variables show higher volatility at the beginning of the sample period. This result reinforce the impression that the set of stylised facts shown by the cross-correlations are the result of the intrinsic characteristic of the market mechanism, as we obtain the same cyclical properties in periods of high volatility as well as in periods of low volatility.

Additionally, we did not find a common temporal performance in the moments of a same variable among the countries; we only found it in certain variables of very close economies such as Canada and the USA. Thus, this result indicates that in spite of the great similarity in the stylised facts among countries, there remains a certain degree of singularity. However, we found a high degree of temporal association among the correlations of the real variables within each country. This high degree of interrelation between the real variables of a country suggests that the variables of a country respond to the same economic shocks or economic environment. Then, all these results suggest that the great similarities found in the cyclical characteristics among countries are mainly the result of the fact that the economic mechanisms are the same in all market economies, rather than that the countries had been subject to coincidental shocks over time.

APPENDIX : DATA ANALYSIS.

From the database of the OECD "Main Economics Indicators":

Real product (GDP): Gross Domestic Product by Expenditure/constant prices/s.a.
Private consumer expenditure (C): Private Final Consumption Expenditure/constant prices/s.a.
Public consumption (G): Final Government Consumption Expenditure/constant prices/s.a.
Investment (FBK): Gross Capital Fixed Formation / constant prices/s.a.
Exports (X): Exports of Goods and Services / current prices/s.a.
Imports (M): Imports of Goods and Services / constant prices/s.a.
Inventories (Sto): Increase in Stocks / constant prices/s.a.
Deflator (P): nominal GDP / real GDP.
Terms of trade (TT): Pm / Px
Industrial production (IPI): Total, s.a /Industrial production / production 1990=100.
Exchange rate (tc): Exchange rates, national currency units per US dollar.
(For Germany the same variables come from the database Quaterly National Accounts of the OECD).

From "Business sectoral data base (BSBD)" from the OECD:

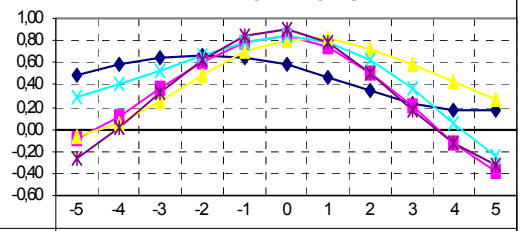
Employment (L): ET of Business Sector Dates Base of OSC97.BSDB.Total Employment 1990=100. For France civilian employment s.a /I/90 was used.
Nominal wage (Wn): hourly rates/wages, Private sector.
Nominal rate of interest (In): IRL of BSDB.

Nominal money (MQM): Money + Quasymoney from the IMF. For Italy M2 was used.
Velocity (Vm): nominal GDP / MQM
Real wage (Wr): Wn / P
Real money (MR): MQM / P
Productivity (Pro): GDP / L

The data are in natural logarithms and they are seasonally adjusted.
The net exports and stocks are as ratios to GDP.

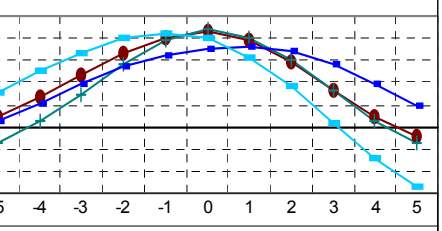
Apéndice 3: Filtro BK

ráfico A5: **IMPORTACIONES.**



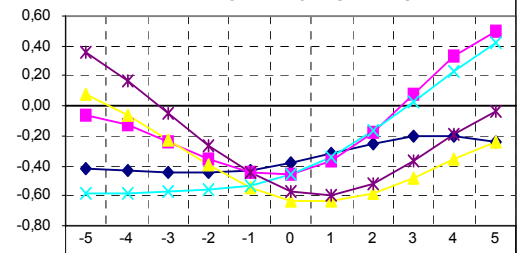
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	0,49	0,58	0,64	0,67	0,65	0,59	0,47	0,34	0,23	0,17	0,17
FRA	-0,08	0,11	0,36	0,60	0,78	0,83	0,74	0,52	0,20	-0,13	-0,39
GBR	-0,07	0,06	0,26	0,49	0,70	0,81	0,81	0,73	0,59	0,42	0,26
USA	0,30	0,40	0,52	0,66	0,78	0,83	0,78	0,62	0,36	0,06	-0,24
ITA	-0,27	0,01	0,34	0,63	0,84	0,90	0,78	0,51	0,18	-0,13	-0,32

Gráfico A5: **IMPORTACIONES**



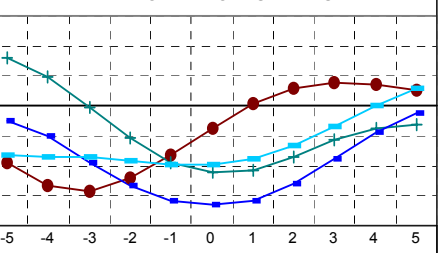
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	0,08	0,27	0,47	0,66	0,81	0,86	0,78	0,59	0,34	0,09	-0,08
CAN	-0,14	0,05	0,30	0,57	0,79	0,88	0,81	0,60	0,33	0,05	-0,15
JPN	0,05	0,20	0,39	0,56	0,65	0,70	0,72	0,67	0,57	0,40	0,19
SUI	0,31	0,50	0,67	0,80	0,85	0,80	0,63	0,36	0,03	-0,29	-0,55

Gráfico A6: **EXPORTACIONES NETAS**



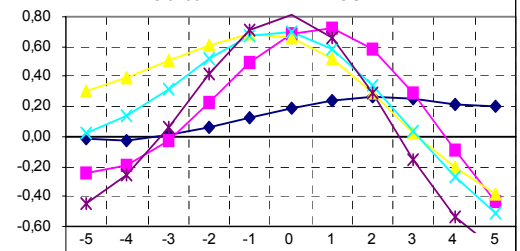
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,41	-0,43	-0,45	-0,45	-0,43	-0,38	-0,31	-0,25	-0,20	-0,20	-0,24
FRA	-0,06	-0,13	-0,24	-0,35	-0,44	-0,46	-0,37	-0,18	0,08	0,33	0,50
GBR	0,08	-0,07	-0,23	-0,40	-0,54	-0,63	-0,64	-0,59	-0,48	-0,36	-0,24
USA	-0,59	-0,58	-0,58	-0,56	-0,53	-0,46	-0,34	-0,17	0,03	0,23	0,42
ITA	0,35	0,16	-0,05	-0,26	-0,45	-0,57	-0,60	-0,52	-0,37	-0,19	-0,04

Gráfico A6: **EXPORTACIONES NETAS**



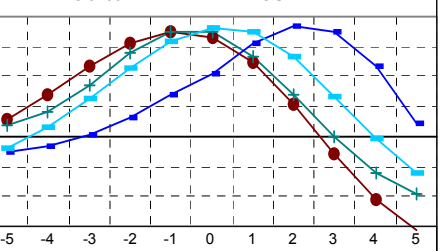
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,38	-0,53	-0,57	-0,49	-0,33	-0,15	0,01	0,12	0,16	0,14	0,10
CAN	0,32	0,19	-0,01	-0,22	-0,38	-0,45	-0,43	-0,34	-0,23	-0,15	-0,13
JPN	-0,10	-0,21	-0,37	-0,54	-0,63	-0,66	-0,64	-0,53	-0,36	-0,18	-0,05
SUI	-0,33	-0,34	-0,35	-0,37	-0,39	-0,40	-0,35	-0,26	-0,14	0,00	0,11

Gráfico A7: **INVENTARIOS**



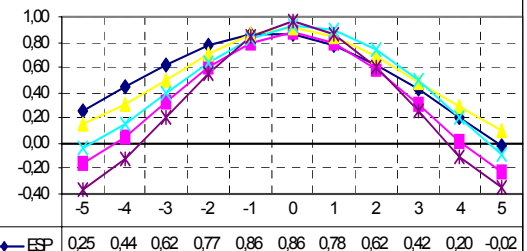
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,02	-0,02	0,01	0,06	0,13	0,18	0,24	0,26	0,25	0,22	0,20
FRA	-0,24	-0,19	-0,02	0,23	0,49	0,68	0,73	0,58	0,28	-0,09	-0,44
GBR	0,30	0,39	0,50	0,61	0,68	0,66	0,52	0,29	0,03	-0,21	-0,39
USA	0,02	0,13	0,32	0,52	0,67	0,70	0,59	0,34	0,03	-0,27	-0,51
ITA	-0,44	-0,26	0,06	0,42	0,71	0,81	0,66	0,29	-0,15	-0,54	-0,75

Gráfico A7: **INVENTARIOS**



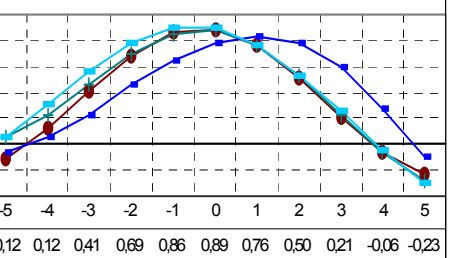
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	0,11	0,28	0,47	0,62	0,69	0,66	0,50	0,22	-0,12	-0,42	-0,62
CAN	0,08	0,16	0,35	0,55	0,69	0,69	0,54	0,28	-0,01	-0,24	-0,39
JPN	-0,10	-0,07	0,01	0,13	0,27	0,42	0,62	0,73	0,70	0,47	0,09
SUI	-0,08	0,06	0,25	0,46	0,63	0,72	0,69	0,53	0,27	-0,01	-0,25

Gráfico A8: **PRODUCCIÓN INDUSTRIAL**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	0,25	0,44	0,62	0,77	0,86	0,86	0,78	0,62	0,42	0,20	-0,02
FRA	-0,17	0,04	0,32	0,60	0,80	0,87	0,79	0,58	0,30	0,01	-0,22
GBR	0,16	0,31	0,51	0,71	0,87	0,92	0,85	0,69	0,49	0,29	0,10
USA	-0,03	0,15	0,39	0,64	0,83	0,93	0,90	0,75	0,50	0,21	-0,08
ITA	-0,36	-0,12	0,21	0,56	0,84	0,96	0,87	0,61	0,26	-0,10	-0,35

Gráfico A8: **PRODUCCIÓN INDUSTRIAL**



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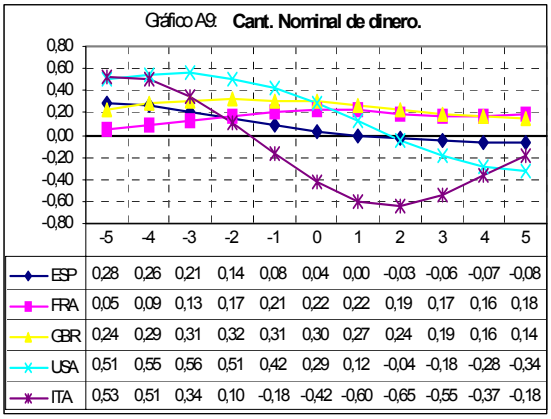
FRG	-0,12	0,12	0,41	0,69	0,86	0,89	0,76	0,50	0,21	-0,06	-0,23
CAN	0,05	0,23	0,46	0,70	0,85	0,88	0,76	0,52	0,23	-0,06	-0,29
JPN	-0,05	0,05	0,23	0,45	0,65	0,78	0,84	0,79	0,60	0,28	-0,09
SUI	0,05	0,31	0,57	0,78	0,90	0,90	0,77	0,53	0,25	-0,04	-0,31

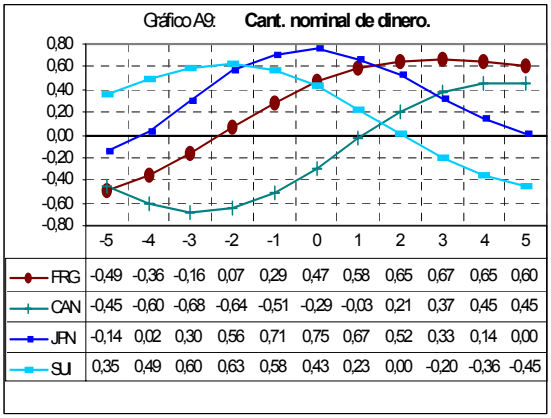
Nominal variables (BK filter)

Gráfico A9: **Cant. Nominal de dinero.**



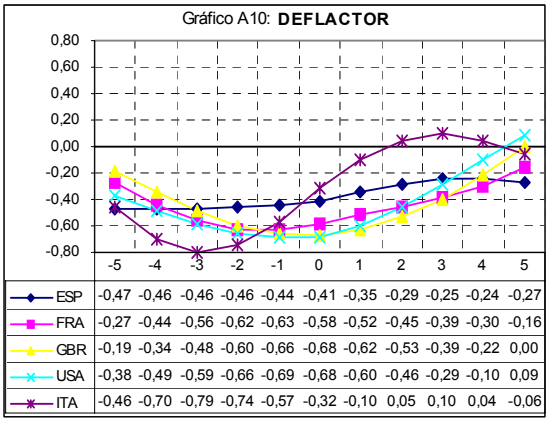
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	0,28	0,26	0,21	0,14	0,08	0,04	0,00	-0,03	-0,06	-0,07	-0,08
FRA	0,05	0,09	0,13	0,17	0,21	0,22	0,22	0,19	0,17	0,16	0,18
GBR	0,24	0,29	0,31	0,32	0,31	0,30	0,27	0,24	0,19	0,16	0,14
USA	0,51	0,55	0,56	0,51	0,42	0,29	0,12	-0,04	-0,18	-0,28	-0,34
ITA	0,53	0,51	0,34	0,10	-0,18	-0,42	-0,60	-0,65	-0,55	-0,37	-0,18

Gráfico A9: **Cant. nominal de dinero.**



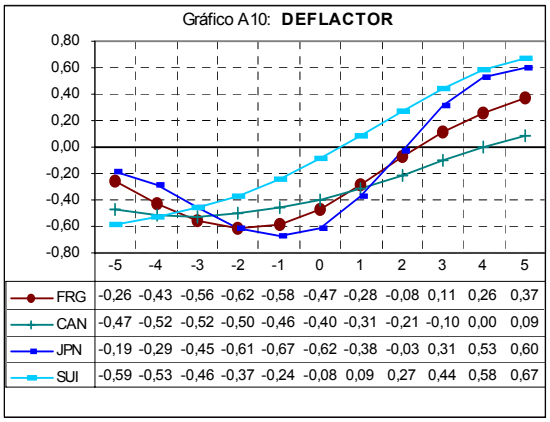
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,49	-0,36	-0,16	0,07	0,29	0,47	0,58	0,65	0,67	0,65	0,60
CAN	-0,45	-0,60	-0,68	-0,64	-0,51	-0,29	-0,03	0,21	0,37	0,45	0,45
JPN	-0,14	0,02	0,30	0,56	0,71	0,75	0,67	0,52	0,33	0,14	0,00
SUI	0,35	0,49	0,60	0,63	0,58	0,43	0,23	0,00	-0,20	-0,36	-0,45

Gráfico A10: **DEFLACTOR**



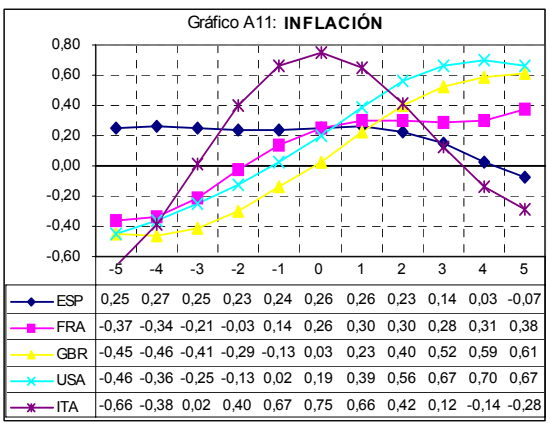
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,47	-0,46	-0,46	-0,46	-0,44	-0,41	-0,35	-0,29	-0,25	-0,24	-0,27
FRA	-0,27	-0,44	-0,56	-0,62	-0,63	-0,58	-0,52	-0,45	-0,39	-0,30	-0,16
GBR	-0,19	-0,34	-0,48	-0,60	-0,66	-0,68	-0,62	-0,53	-0,39	-0,22	0,00
USA	-0,38	-0,49	-0,59	-0,66	-0,69	-0,68	-0,60	-0,46	-0,29	-0,10	0,09
ITA	-0,46	-0,70	-0,79	-0,74	-0,57	-0,32	-0,10	0,05	0,10	0,04	-0,06

Gráfico A10: **DEFLACTOR**



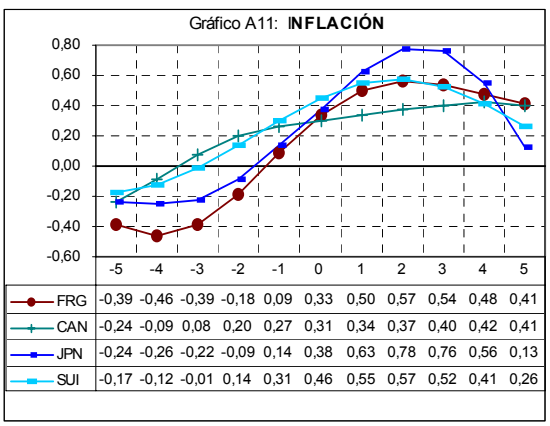
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,26	-0,43	-0,56	-0,62	-0,58	-0,47	-0,28	-0,08	0,11	0,26	0,37
CAN	-0,47	-0,52	-0,52	-0,50	-0,46	-0,40	-0,31	-0,21	-0,10	0,00	0,09
JPN	-0,19	-0,29	-0,45	-0,61	-0,67	-0,62	-0,38	-0,03	0,31	0,53	0,60
SUI	-0,59	-0,53	-0,46	-0,37	-0,24	-0,08	0,09	0,27	0,44	0,58	0,67

Gráfico A11: **INFLACIÓN**



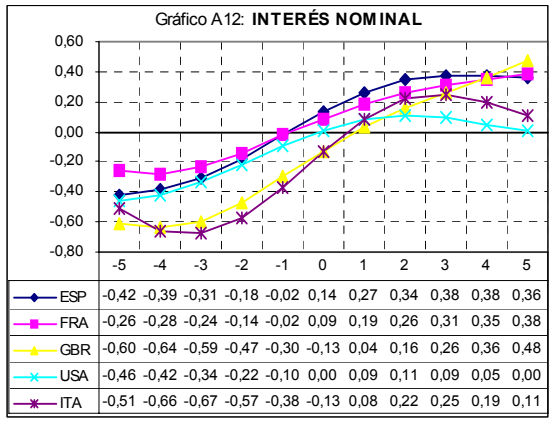
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	0,25	0,27	0,25	0,23	0,24	0,26	0,26	0,23	0,14	0,03	-0,07
FRA	-0,37	-0,34	-0,21	-0,03	0,14	0,26	0,30	0,30	0,28	0,31	0,38
GBR	-0,45	-0,46	-0,41	-0,29	-0,13	0,03	0,23	0,40	0,52	0,59	0,61
USA	-0,46	-0,36	-0,25	-0,13	0,02	0,19	0,39	0,56	0,67	0,70	0,67
ITA	-0,66	-0,38	0,02	0,40	0,67	0,75	0,66	0,42	0,12	-0,14	-0,28

Gráfico A11: **INFLACIÓN**



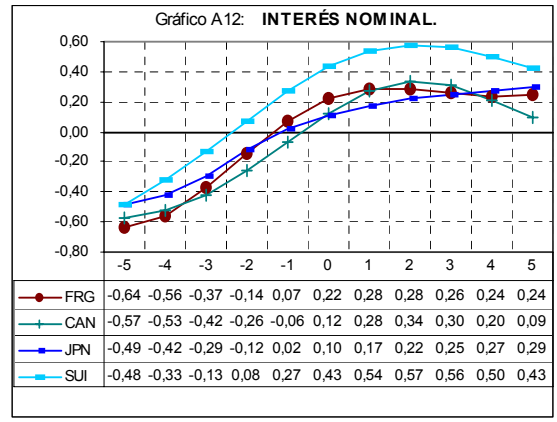
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,39	-0,46	-0,39	-0,18	0,09	0,33	0,50	0,57	0,54	0,48	0,41
CAN	-0,24	-0,09	0,08	0,20	0,27	0,31	0,34	0,37	0,40	0,42	0,41
JPN	-0,24	-0,26	-0,22	-0,09	0,14	0,38	0,63	0,78	0,76	0,56	0,13
SUI	-0,17	-0,12	-0,01	0,14	0,31	0,46	0,55	0,57	0,52	0,41	0,26

Gráfico A12: **INTERÉS NOMINAL**



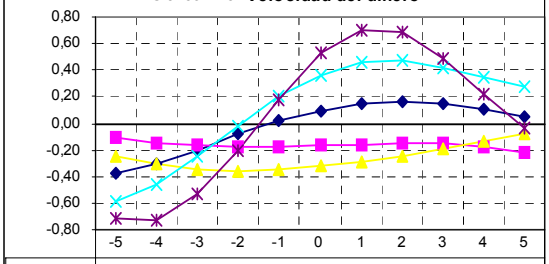
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,42	-0,39	-0,31	-0,18	-0,02	0,14	0,27	0,34	0,38	0,38	0,36
FRA	-0,26	-0,28	-0,24	-0,14	-0,02	0,09	0,19	0,26	0,31	0,35	0,38
GBR	-0,60	-0,64	-0,59	-0,47	-0,30	-0,13	0,04	0,16	0,26	0,36	0,48
USA	-0,46	-0,42	-0,34	-0,22	-0,10	0,00	0,09	0,11	0,09	0,05	0,00
ITA	-0,51	-0,66	-0,67	-0,57	-0,38	-0,13	0,08	0,22	0,25	0,19	0,11

Gráfico A12: **INTERÉS NOMINAL.**



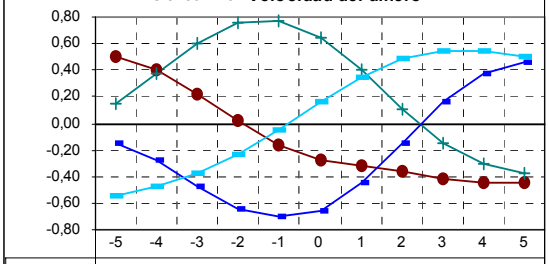
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,64	-0,56	-0,37	-0,14	0,07	0,22	0,28	0,28	0,26	0,24	0,24
CAN	-0,57	-0,53	-0,42	-0,26	-0,06	0,12	0,28	0,34	0,30	0,20	0,09
JPN	-0,49	-0,42	-0,29	-0,12	0,02	0,10	0,17	0,22	0,25	0,27	0,29
SUI	-0,48	-0,33	-0,13	0,08	0,27	0,43	0,54	0,57	0,56	0,50	0,43

Gráfico A13: **Velocidad del dinero**



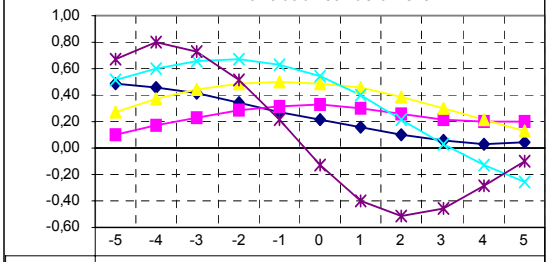
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,38	-0,31	-0,20	-0,08	0,02	0,09	0,15	0,16	0,15	0,11	0,05
FRA	-0,11	-0,15	-0,16	-0,17	-0,17	-0,17	-0,16	-0,15	-0,15	-0,18	-0,22
GBR	-0,24	-0,31	-0,35	-0,36	-0,34	-0,32	-0,29	-0,25	-0,20	-0,14	-0,08
USA	-0,59	-0,46	-0,25	-0,02	0,20	0,36	0,46	0,47	0,42	0,35	0,27
ITA	-0,72	-0,73	-0,53	-0,20	0,18	0,52	0,70	0,68	0,49	0,22	-0,03

Gráfico A13: **Velocidad del dinero**



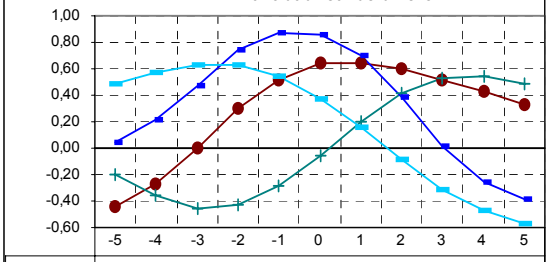
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	0,50	0,40	0,23	0,02	-0,16	-0,28	-0,32	-0,37	-0,41	-0,44	-0,44
CAN	0,15	0,38	0,61	0,76	0,78	0,65	0,40	0,11	-0,14	-0,31	-0,38
JPN	-0,16	-0,28	-0,47	-0,65	-0,71	-0,66	-0,45	-0,14	0,16	0,38	0,46
SUI	-0,54	-0,48	-0,38	-0,24	-0,05	0,16	0,34	0,48	0,55	0,55	0,50

Gráfico A14: **Cantidad real de dinero**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	0,48	0,46	0,41	0,34	0,28	0,22	0,15	0,10	0,05	0,03	0,04
FRA	0,10	0,17	0,23	0,28	0,32	0,32	0,30	0,26	0,22	0,20	0,20
GBR	0,27	0,37	0,44	0,48	0,50	0,49	0,45	0,38	0,30	0,21	0,13
USA	0,52	0,61	0,66	0,67	0,63	0,55	0,40	0,22	0,03	-0,14	-0,26
ITA	0,67	0,80	0,73	0,52	0,21	-0,13	-0,39	-0,51	-0,45	-0,29	-0,10

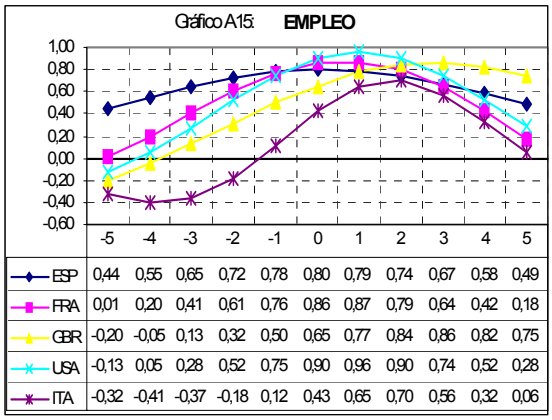
Gráfico A14: **Cantidad real de dinero**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,45	-0,27	0,00	0,29	0,52	0,64	0,65	0,60	0,52	0,43	0,34
CAN	-0,20	-0,36	-0,45	-0,43	-0,29	-0,06	0,20	0,41	0,53	0,55	0,49
JPN	0,05	0,21	0,48	0,74	0,87	0,86	0,70	0,38	0,01	-0,26	-0,39
SUI	0,48	0,58	0,64	0,63	0,55	0,38	0,15	-0,09	-0,31	-0,48	-0,57

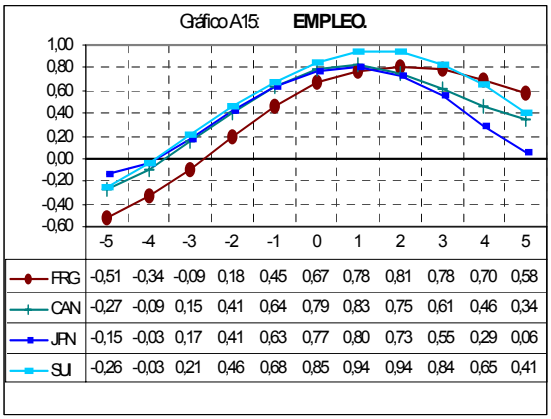
Labour market (BK filter)

Gráfico A15: **EMPLEO**



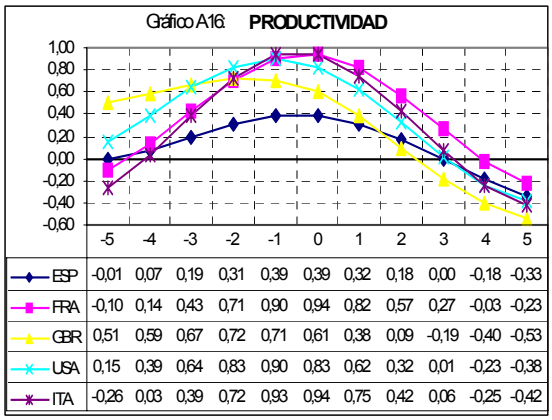
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	0,44	0,55	0,65	0,72	0,78	0,80	0,79	0,74	0,67	0,58	0,49
FRA	0,01	0,20	0,41	0,61	0,76	0,86	0,87	0,79	0,64	0,42	0,18
GBR	-0,20	-0,05	0,13	0,32	0,50	0,65	0,77	0,84	0,86	0,82	0,75
USA	-0,13	0,05	0,28	0,52	0,75	0,90	0,96	0,90	0,74	0,52	0,28
ITA	-0,32	-0,41	-0,37	-0,18	0,12	0,43	0,65	0,70	0,56	0,32	0,06

Gráfico A15: **EMPLEO.**



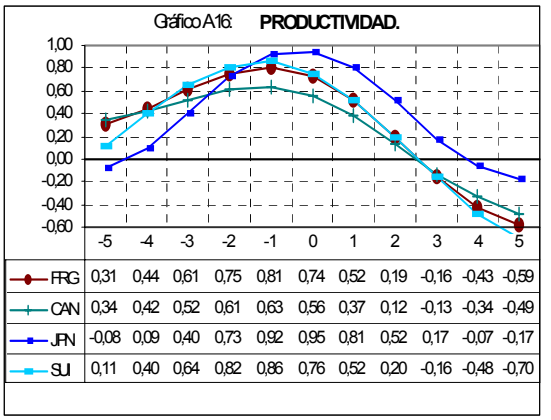
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,51	-0,34	-0,09	0,18	0,45	0,67	0,78	0,81	0,78	0,70	0,58
CAN	-0,27	-0,09	0,15	0,41	0,64	0,79	0,83	0,75	0,61	0,46	0,34
JPN	-0,15	-0,03	0,17	0,41	0,63	0,77	0,80	0,73	0,55	0,29	0,06
SUI	-0,26	-0,03	0,21	0,46	0,68	0,85	0,94	0,94	0,84	0,65	0,41

Gráfico A16: **PRODUCTIVIDAD**



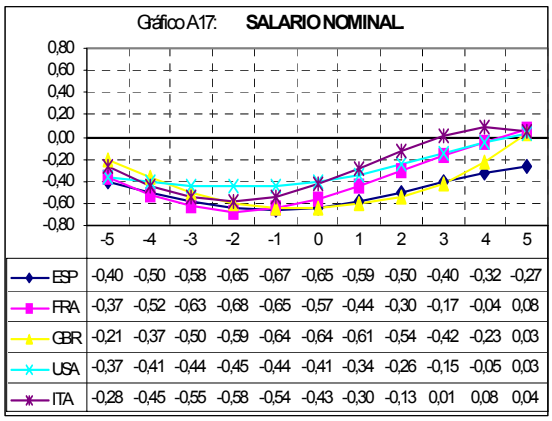
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,01	0,07	0,19	0,31	0,39	0,39	0,32	0,18	0,00	-0,18	-0,33
FRA	-0,10	0,14	0,43	0,71	0,90	0,94	0,82	0,57	0,27	-0,03	-0,23
GBR	0,51	0,59	0,67	0,72	0,71	0,61	0,38	0,09	-0,19	-0,40	-0,53
USA	0,15	0,39	0,64	0,83	0,90	0,83	0,62	0,32	0,01	-0,23	-0,38
ITA	-0,26	0,03	0,39	0,72	0,93	0,94	0,75	0,42	0,06	-0,25	-0,42

Gráfico A16: **PRODUCTIVIDAD.**



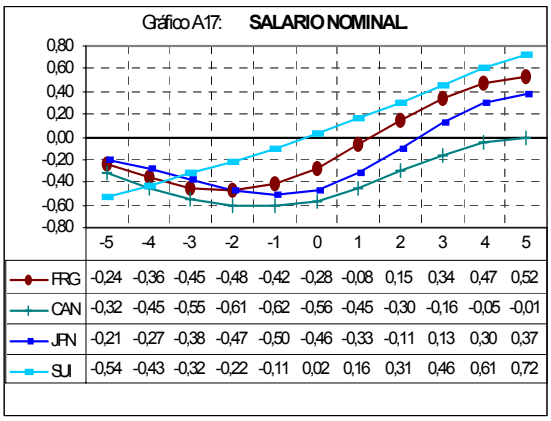
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	0,31	0,44	0,61	0,75	0,81	0,74	0,52	0,19	-0,16	-0,43	-0,59
CAN	0,34	0,42	0,52	0,61	0,63	0,56	0,37	0,12	-0,13	-0,34	-0,49
JPN	-0,08	0,09	0,40	0,73	0,92	0,95	0,81	0,52	0,17	-0,07	-0,17
SUI	0,11	0,40	0,64	0,82	0,86	0,76	0,52	0,20	-0,16	-0,48	-0,70

Gráfico A17: **SALARIO NOMINAL**



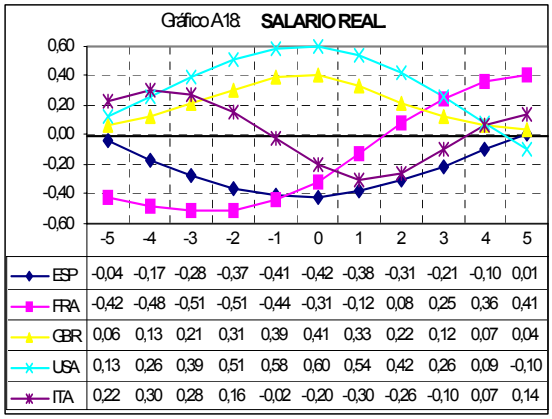
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,40	-0,50	-0,58	-0,65	-0,67	-0,65	-0,59	-0,50	-0,40	-0,32	-0,27
FRA	-0,37	-0,52	-0,63	-0,68	-0,65	-0,57	-0,44	-0,30	-0,17	-0,04	0,08
GBR	-0,21	-0,37	-0,50	-0,59	-0,64	-0,64	-0,61	-0,54	-0,42	-0,23	0,03
USA	-0,37	-0,41	-0,44	-0,45	-0,44	-0,41	-0,34	-0,26	-0,15	-0,05	0,03
ITA	-0,28	-0,45	-0,55	-0,58	-0,54	-0,43	-0,30	-0,13	0,01	0,08	0,04

Gráfico A17: **SALARIO NOMINAL**



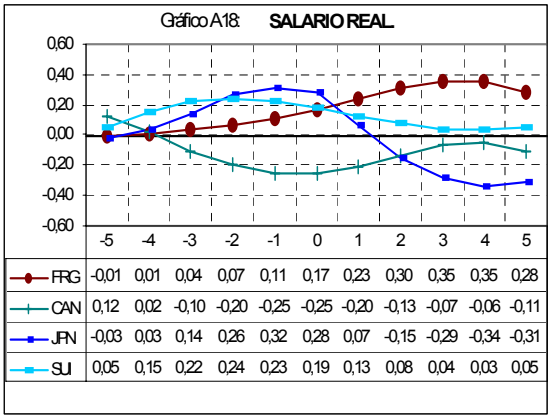
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,24	-0,36	-0,45	-0,48	-0,42	-0,28	-0,08	0,15	0,34	0,47	0,52
CAN	-0,32	-0,45	-0,55	-0,61	-0,62	-0,56	-0,45	-0,30	-0,16	-0,05	-0,01
JPN	-0,21	-0,27	-0,38	-0,47	-0,50	-0,46	-0,33	-0,11	0,13	0,30	0,37
SUI	-0,54	-0,43	-0,32	-0,22	-0,11	0,02	0,16	0,31	0,46	0,61	0,72

Gráfico A18: **SALARIO REAL**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,04	-0,17	-0,28	-0,37	-0,41	-0,42	-0,38	-0,31	-0,21	-0,10	0,01
FRA	-0,42	-0,48	-0,51	-0,51	-0,44	-0,31	-0,12	0,08	0,25	0,36	0,41
GBR	0,06	0,13	0,21	0,31	0,39	0,41	0,33	0,22	0,12	0,07	0,04
USA	0,13	0,26	0,39	0,51	0,58	0,60	0,54	0,42	0,26	0,09	-0,10
ITA	0,22	0,30	0,28	0,16	-0,02	-0,20	-0,30	-0,26	-0,10	0,07	0,14

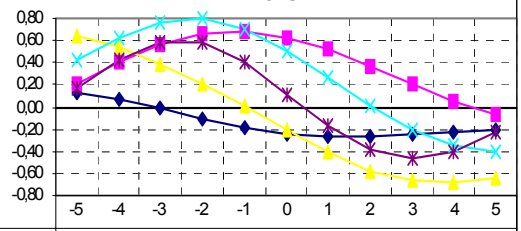
Gráfico A18: **SALARIO REAL**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,01	0,01	0,04	0,07	0,11	0,17	0,23	0,30	0,35	0,35	0,28
CAN	0,12	0,02	-0,10	-0,20	-0,25	-0,25	-0,20	-0,13	-0,07	-0,06	-0,11
JPN	-0,03	0,03	0,14	0,26	0,32	0,28	0,07	-0,15	-0,29	-0,34	-0,31
SUI	0,05	0,15	0,22	0,24	0,23	0,19	0,13	0,08	0,04	0,03	0,05

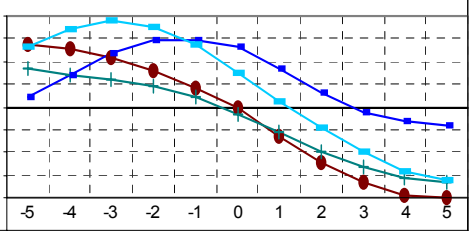
Cross-correlations with employment (BK filter)

Gráfico A19: **PRODUCTIVIDAD.**



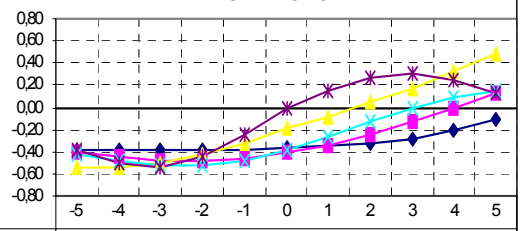
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	0,13	0,06	-0,02	-0,10	-0,18	-0,25	-0,27	-0,26	-0,24	-0,22	-0,20
FRA	0,20	0,40	0,57	0,67	0,69	0,63	0,52	0,37	0,21	0,06	-0,06
GBR	0,64	0,54	0,39	0,21	0,00	-0,21	-0,41	-0,58	-0,67	-0,68	-0,64
USA	0,42	0,62	0,76	0,79	0,70	0,51	0,26	0,01	-0,21	-0,34	-0,40
ITA	0,18	0,42	0,58	0,58	0,41	0,11	-0,17	-0,38	-0,46	-0,40	-0,23

Gráfico A19: **PRODUCTIVIDAD.**



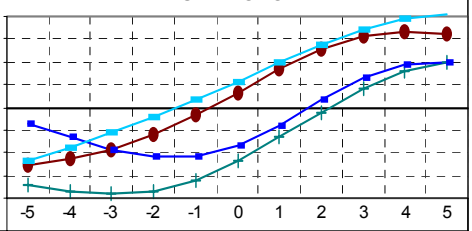
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	0,56	0,51	0,43	0,32	0,17	-0,01	-0,26	-0,49	-0,67	-0,77	-0,79
CAN	0,34	0,29	0,24	0,18	0,08	-0,06	-0,23	-0,40	-0,54	-0,63	-0,66
JPN	0,09	0,29	0,48	0,59	0,60	0,53	0,34	0,13	-0,04	-0,13	-0,16
SUI	0,53	0,69	0,76	0,71	0,54	0,30	0,05	-0,19	-0,40	-0,57	-0,64

Gráfico A20: **SALARIO NOMINAL**



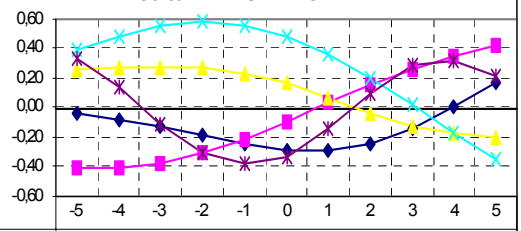
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,38	-0,38	-0,39	-0,39	-0,38	-0,36	-0,35	-0,33	-0,28	-0,20	-0,10
FRA	-0,40	-0,45	-0,49	-0,49	-0,46	-0,41	-0,34	-0,25	-0,13	0,00	0,13
GBR	-0,54	-0,55	-0,51	-0,43	-0,32	-0,20	-0,08	0,04	0,17	0,33	0,48
USA	-0,43	-0,49	-0,52	-0,52	-0,47	-0,39	-0,27	-0,14	-0,01	0,09	0,15
ITA	-0,39	-0,51	-0,54	-0,45	-0,25	0,00	0,15	0,27	0,30	0,25	0,14

Gráfico 20: **SALARIO NOMINAL**



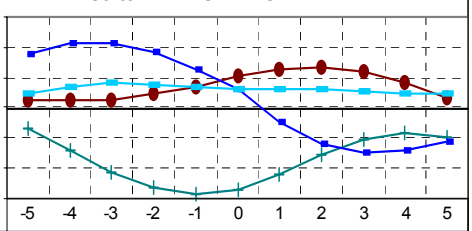
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,50	-0,46	-0,37	-0,23	-0,07	0,12	0,33	0,50	0,62	0,67	0,65
CAN	-0,68	-0,74	-0,77	-0,74	-0,64	-0,47	-0,26	-0,04	0,16	0,32	0,40
JPN	-0,15	-0,26	-0,38	-0,44	-0,43	-0,35	-0,16	0,07	0,27	0,37	0,39
SUI	-0,47	-0,35	-0,22	-0,09	0,06	0,23	0,39	0,55	0,68	0,78	0,83

Gráfico A21: **SALARIO REAL**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,04	-0,08	-0,13	-0,19	-0,25	-0,29	-0,29	-0,24	-0,15	0,00	0,17
FRA	-0,41	-0,40	-0,37	-0,31	-0,21	-0,10	0,04	0,16	0,26	0,35	0,42
GBR	0,26	0,27	0,28	0,27	0,23	0,17	0,07	-0,04	-0,12	-0,17	-0,20
USA	0,39	0,49	0,56	0,58	0,55	0,47	0,36	0,20	0,02	-0,17	-0,35
ITA	0,34	0,14	-0,11	-0,31	-0,38	-0,33	-0,14	0,10	0,28	0,32	0,21

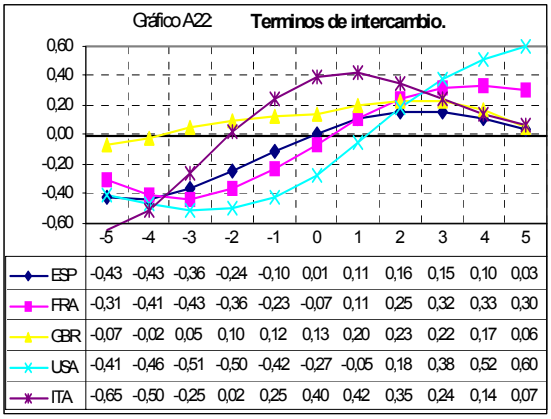
Gráfico A21: **SALARIO REAL**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	0,05	0,05	0,06	0,09	0,14	0,21	0,25	0,27	0,24	0,17	0,06
CAN	-0,14	-0,29	-0,43	-0,53	-0,57	-0,54	-0,44	-0,31	-0,21	-0,17	-0,19
JPN	0,35	0,42	0,43	0,37	0,26	0,12	-0,10	-0,25	-0,30	-0,28	-0,23
SUI	0,10	0,14	0,16	0,16	0,14	0,13	0,13	0,12	0,11	0,10	0,09

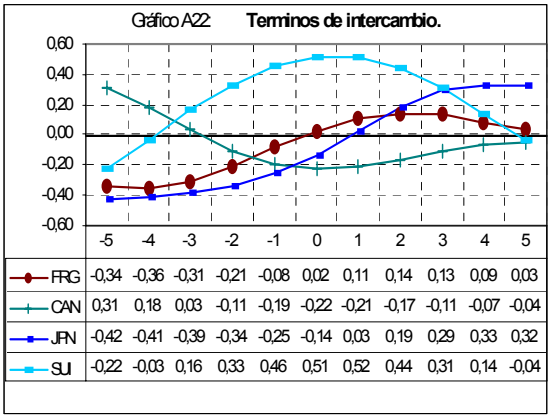
External Sector (BK filter)

Gráfico A22 **Terminos de intercambio.**



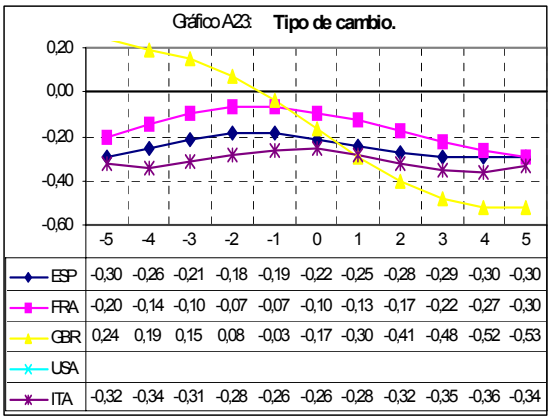
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,43	-0,43	-0,36	-0,24	-0,10	0,01	0,11	0,16	0,15	0,10	0,03
FRA	-0,31	-0,41	-0,43	-0,36	-0,23	-0,07	0,11	0,25	0,32	0,33	0,30
GBR	-0,07	-0,02	0,05	0,10	0,12	0,13	0,20	0,23	0,22	0,17	0,06
USA	-0,41	-0,46	-0,51	-0,50	-0,42	-0,27	-0,05	0,18	0,38	0,52	0,60
ITA	-0,65	-0,50	-0,25	0,02	0,25	0,40	0,42	0,35	0,24	0,14	0,07

Gráfico A22 **Terminos de intercambio.**



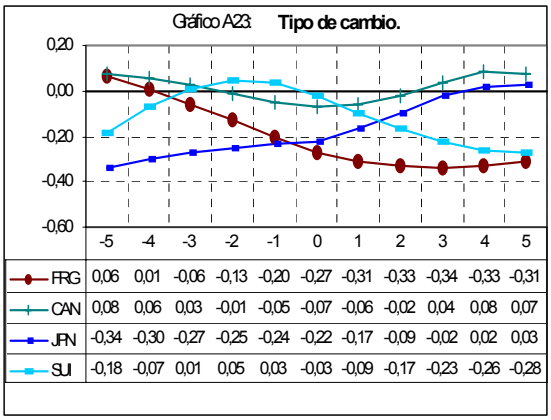
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,34	-0,36	-0,31	-0,21	-0,08	0,02	0,11	0,14	0,13	0,09	0,03
CAN	0,31	0,18	0,03	-0,11	-0,19	-0,22	-0,21	-0,17	-0,11	-0,07	-0,04
JPN	-0,42	-0,41	-0,39	-0,34	-0,25	-0,14	0,03	0,19	0,29	0,33	0,32
SUI	-0,22	-0,03	0,16	0,33	0,46	0,51	0,52	0,44	0,31	0,14	-0,04

Gráfico A23: **Tipo de cambio.**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,30	-0,26	-0,21	-0,18	-0,19	-0,22	-0,25	-0,28	-0,29	-0,30	-0,30
FRA	-0,20	-0,14	-0,10	-0,07	-0,07	-0,10	-0,13	-0,17	-0,22	-0,27	-0,30
GBR	0,24	0,19	0,15	0,08	-0,03	-0,17	-0,30	-0,41	-0,48	-0,52	-0,53
USA											
ITA	-0,32	-0,34	-0,31	-0,28	-0,26	-0,26	-0,28	-0,32	-0,35	-0,36	-0,34

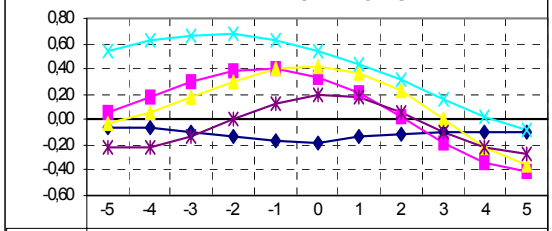
Gráfico A23: **Tipo de cambio.**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	0,06	0,01	-0,06	-0,13	-0,20	-0,27	-0,31	-0,33	-0,34	-0,33	-0,31
CAN	0,08	0,06	0,03	-0,01	-0,05	-0,07	-0,06	-0,02	0,04	0,08	0,07
JPN	-0,34	-0,30	-0,27	-0,25	-0,24	-0,22	-0,17	-0,09	-0,02	0,02	0,03
SUI	-0,18	-0,07	0,01	0,05	0,03	-0,03	-0,09	-0,17	-0,23	-0,26	-0,28

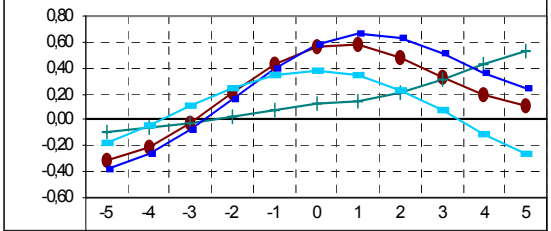
Cross-correlations with the terms of trade (BK filter)

Gráfico A24: **EXPORTACIONES.**



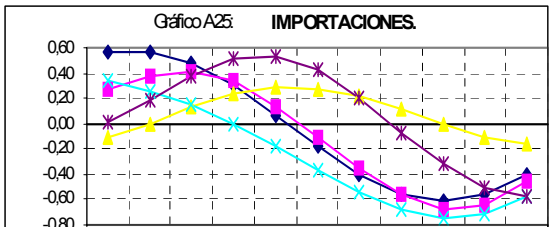
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,06	-0,07	-0,10	-0,14	-0,17	-0,18	-0,14	-0,11	-0,10	-0,11	-0,10
FRA	0,06	0,18	0,30	0,39	0,40	0,33	0,21	0,02	-0,18	-0,35	-0,42
GBR	-0,03	0,06	0,17	0,30	0,40	0,42	0,37	0,22	0,01	-0,21	-0,36
USA	0,53	0,62	0,67	0,67	0,63	0,54	0,44	0,31	0,17	0,03	-0,08
ITA	-0,23	-0,22	-0,13	0,00	0,13	0,20	0,17	0,05	-0,09	-0,21	-0,26

Gráfico A24: **EXPORTACIONES.**



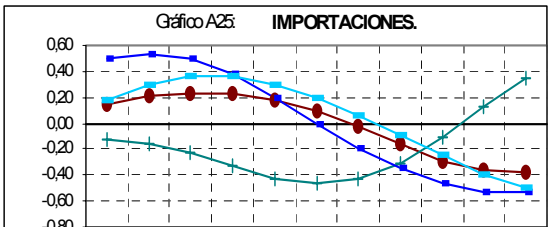
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,31	-0,21	-0,03	0,21	0,43	0,57	0,58	0,47	0,32	0,19	0,11
CAN	-0,09	-0,06	-0,02	0,02	0,07	0,12	0,15	0,21	0,30	0,42	0,52
JPN	-0,38	-0,26	-0,08	0,15	0,39	0,58	0,67	0,64	0,52	0,37	0,24
SUI	-0,19	-0,04	0,11	0,25	0,34	0,37	0,34	0,23	0,07	-0,11	-0,27

Gráfico A25: **IMPORTACIONES.**



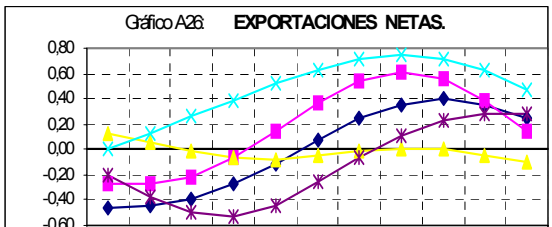
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	0,57	0,57	0,48	0,31	0,07	-0,19	-0,40	-0,55	-0,61	-0,55	-0,41
FRA	0,27	0,37	0,41	0,33	0,14	-0,12	-0,35	-0,56	-0,67	-0,64	-0,45
GBR	-0,11	0,00	0,13	0,24	0,30	0,28	0,22	0,12	0,00	-0,10	-0,15
USA	0,34	0,26	0,15	0,00	-0,18	-0,37	-0,54	-0,68	-0,75	-0,71	-0,58
ITA	0,01	0,19	0,38	0,52	0,54	0,42	0,20	-0,07	-0,32	-0,50	-0,57

Gráfico A25: **IMPORTACIONES.**



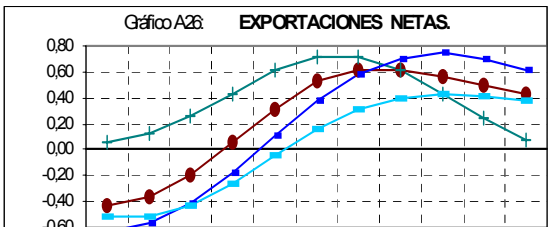
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	0,15	0,21	0,23	0,22	0,17	0,09	-0,02	-0,16	-0,29	-0,37	-0,38
CAN	-0,12	-0,16	-0,23	-0,33	-0,42	-0,46	-0,43	-0,31	-0,10	0,13	0,34
JPN	0,50	0,53	0,49	0,38	0,20	-0,01	-0,20	-0,35	-0,47	-0,53	-0,54
SUI	0,18	0,30	0,37	0,37	0,30	0,19	0,06	-0,09	-0,24	-0,39	-0,49

Gráfico A26: **EXPORTACIONES NETAS.**



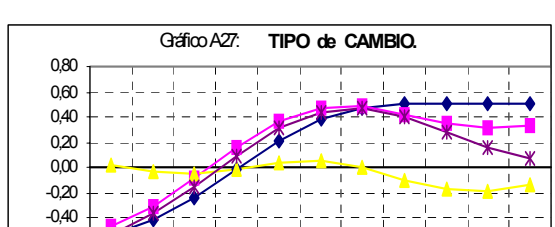
	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,46	-0,45	-0,39	-0,27	-0,11	0,07	0,24	0,36	0,39	0,35	0,24
FRA	-0,26	-0,28	-0,22	-0,07	0,15	0,37	0,54	0,61	0,56	0,39	0,14
GBR	0,12	0,05	-0,02	-0,07	-0,08	-0,04	-0,01	0,01	0,00	-0,04	-0,09
USA	0,01	0,13	0,26	0,39	0,52	0,63	0,72	0,75	0,72	0,62	0,47
ITA	-0,20	-0,37	-0,50	-0,52	-0,44	-0,26	-0,07	0,11	0,23	0,28	0,28

Gráfico A26: **EXPORTACIONES NETAS.**



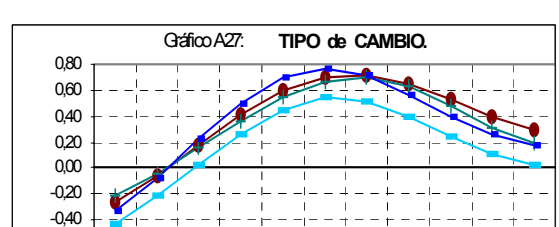
	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,44	-0,37	-0,20	0,05	0,32	0,52	0,62	0,62	0,56	0,50	0,44
CAN	0,05	0,13	0,25	0,43	0,61	0,72	0,72	0,61	0,43	0,24	0,07
JPN	-0,63	-0,57	-0,42	-0,18	0,10	0,38	0,58	0,71	0,74	0,70	0,61
SUI	-0,52	-0,52	-0,43	-0,26	-0,05	0,16	0,31	0,40	0,43	0,42	0,38

Gráfico A27: **TIPO de CAMBIO.**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
ESP	-0,52	-0,42	-0,24	-0,01	0,22	0,38	0,47	0,50	0,51	0,50	0,50
FRA	-0,45	-0,30	-0,09	0,16	0,37	0,48	0,49	0,42	0,35	0,32	0,33
GBR	0,01	-0,03	-0,04	-0,01	0,04	0,05	0,00	-0,09	-0,17	-0,19	-0,14
USA											
ITA	-0,53	-0,37	-0,14	0,10	0,31	0,44	0,46	0,40	0,28	0,16	0,08

Gráfico A27: **TIPO de CAMBIO.**



	-5	-4	-3	-2	-1	0	1	2	3	4	5
FRG	-0,27	-0,07	0,17	0,41	0,60	0,71	0,72	0,64	0,52	0,40	0,30
CAN	-0,22	-0,04	0,16	0,36	0,55	0,67	0,70	0,63	0,48	0,32	0,19
JPN	-0,32	-0,08	0,22	0,50	0,70	0,77	0,71	0,56	0,39	0,25	0,18
SUI	-0,43	-0,22	0,02	0,27	0,45	0,54	0,52	0,40	0,25	0,11	0,02

Gráfico A32: **Correlaciones máximas con el PIB (filtro BK)**

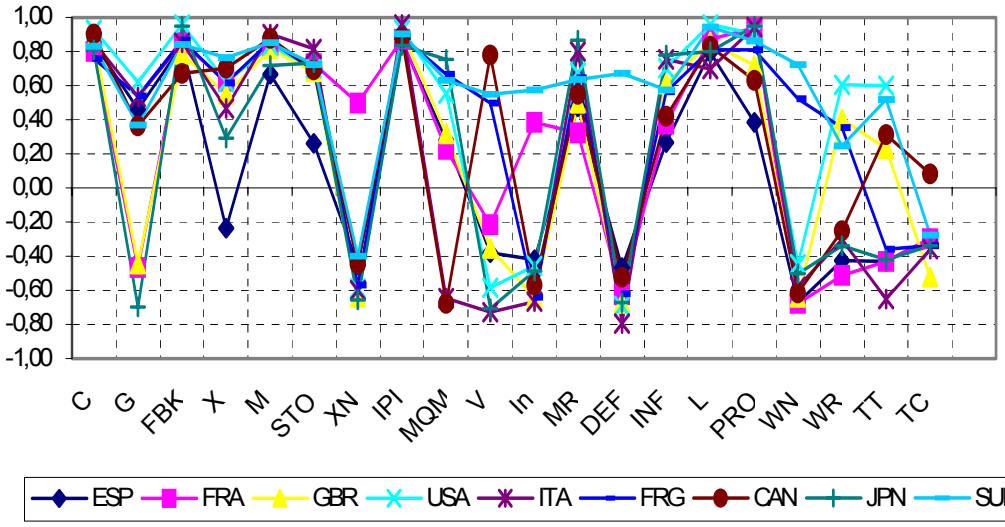


Gráfico A33: **Correlaciones contemporaneas con el PIB (filtro BK)**

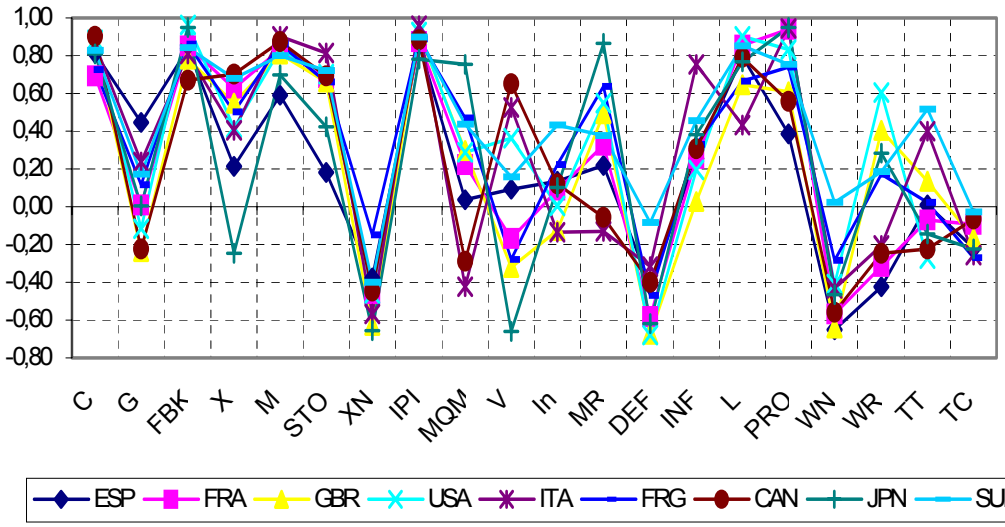


Gráfico A34: **Variabilidad absoluta (filtro BK)**

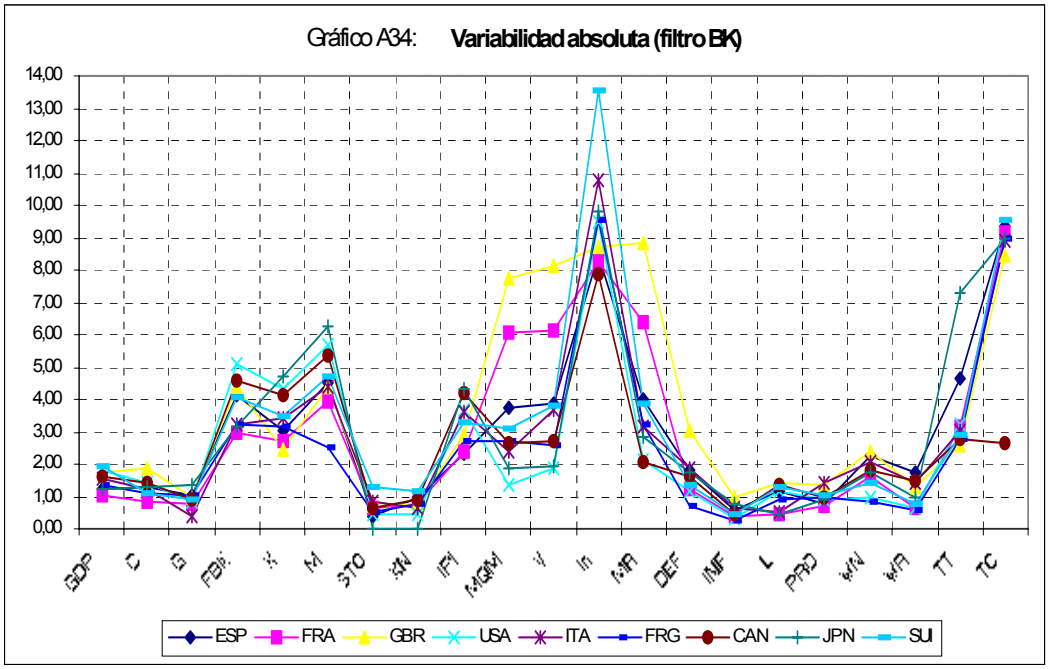
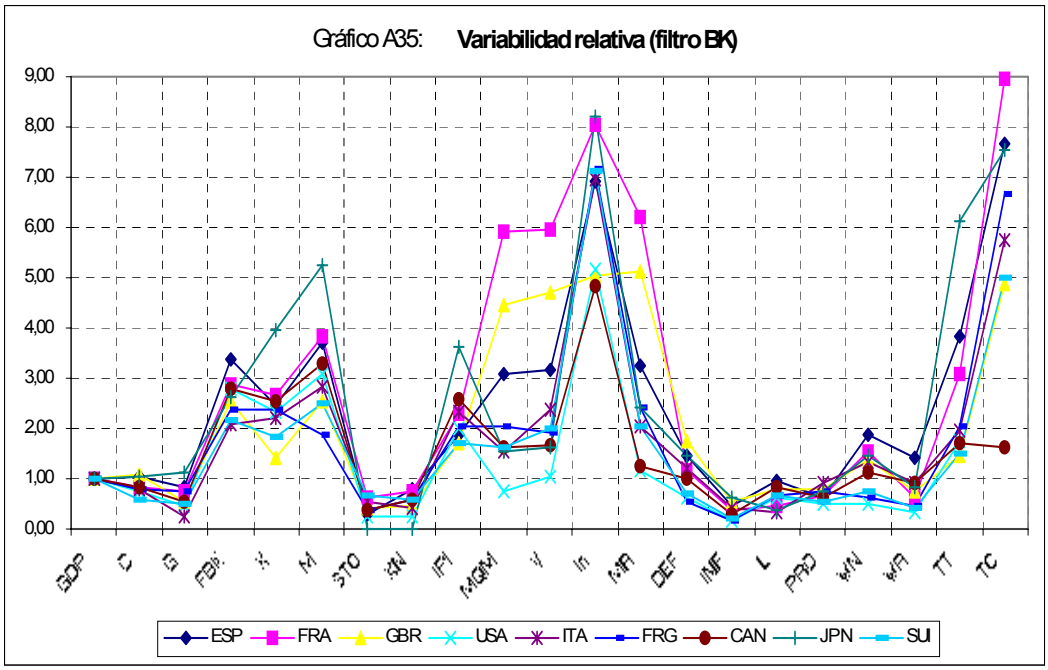


Gráfico A35: **Variabilidad relativa (filtro BK)**



Volatilities relatives to GDP (BK filter).*

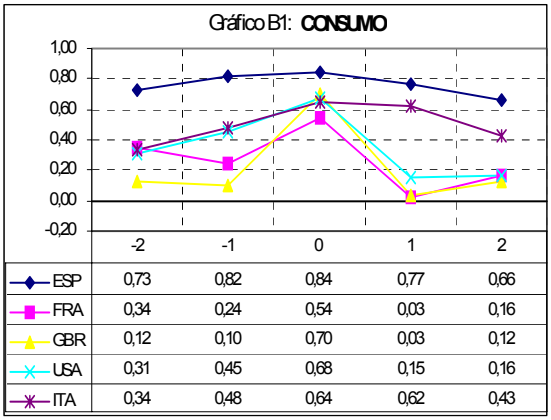
REAL VARIABLES									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
GDP	1.22	1.03	1.73	1.83	1.55	1.34	1.63	1.19	1.90
C	1.05	0.84	1.09	0.76	0.77	0.80	0.85	1.06	0.57
G	0.85	0.73	0.54	0.44	0.26	0.76	0.54	1.12	0.48
FBK	3.39	2.86	2.53	2.78	2.06	2.39	2.79	2.63	2.14
X	2.47	2.64	1.40	2.34	2.21	2.36	2.52	3.96	1.83
M	3.69	3.83	2.52	3.08	2.83	1.85	3.29	5.25	2.48
STO	0.30	0.63	0.40	0.24	0.54	0.39	0.38	0.21	0.66
XN	0.81	0.75	0.44	0.25	0.40	0.58	0.56	0.56	0.60
IPI	1.87	2.30	1.69	1.99	2.34	2.03	2.57	3.61	1.71

MONETARY VARIABLES									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
MQM	3.08	5.90	4.47	0.73	1.54	2.03	1.61	1.54	1.62
MR	3.25	6.19	5.11	1.15	2.05	2.40	1.25	2.39	2.02
V	3.18	5.94	4.70	1.03	2.38	1.92	1.64	1.61	2.01
IN	6.90	8.06	5.02	5.16	6.95	7.14	4.83	8.21	7.11
DEF	1.47	1.17	1.74	0.61	1.22	0.52	0.99	1.46	0.70
INF	0.45	0.35	0.54	0.16	0.42	0.17	0.28	0.63	0.22
LABOUR MARKET									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
L	0.95	0.44	0.80	0.64	0.32	0.67	0.83	0.37	0.68
Pro	0.62	0.66	0.77	0.50	0.90	0.74	0.61	0.75	0.55
Wn	1.85	1.54	1.38	0.51	1.33	0.61	1.11	1.45	0.73
WR	1.41	0.62	0.73	0.34	0.92	0.43	0.92	0.82	0.40
EXTERNAL SECTOR									
	SPN	FRA	UK	USA	ITA	GER	CAN	JPN	SUI
TT	3.82	3.08	1.47	1.76	1.95	2.05	1.69	6.12	1.51
TC	7.64	8.94	4.89	--	5.76	6.68	1.63	7.52	5.02

***** BK filter (1970:2-1993:4). The variability for GDP's is absolute (in percentage); for the other variables are relatives to the GDP´s volatility.

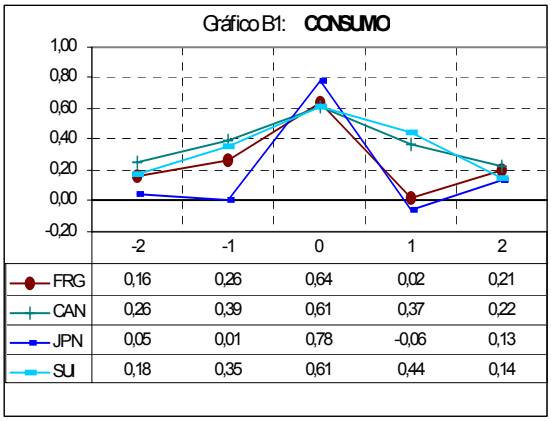
GRAPHIC APPENDIX : First difference filter

Gráfico B1: **CONSUMO**



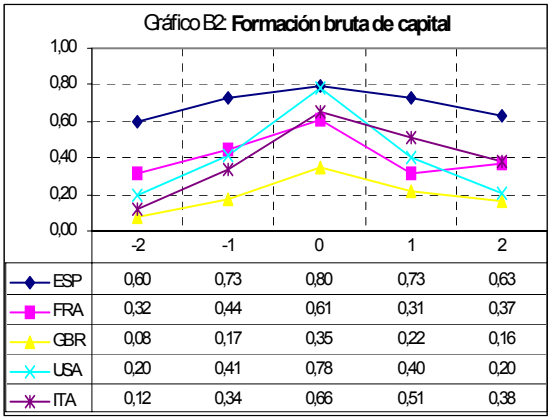
	-2	-1	0	1	2
ESP	0,73	0,82	0,84	0,77	0,66
FRA	0,34	0,24	0,54	0,03	0,16
GBR	0,12	0,10	0,70	0,03	0,12
USA	0,31	0,45	0,68	0,15	0,16
ITA	0,34	0,48	0,64	0,62	0,43

Gráfico B1: **CONSUMO**



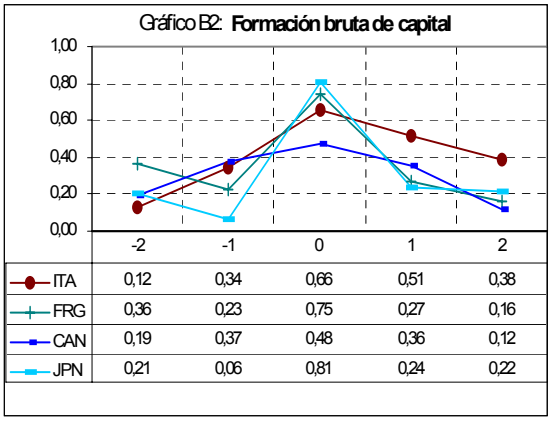
	-2	-1	0	1	2
FRG	0,16	0,26	0,64	0,02	0,21
CAN	0,26	0,39	0,61	0,37	0,22
JPN	0,05	0,01	0,78	-0,06	0,13
SUI	0,18	0,35	0,61	0,44	0,14

Gráfico B2: **Formación bruta de capital**



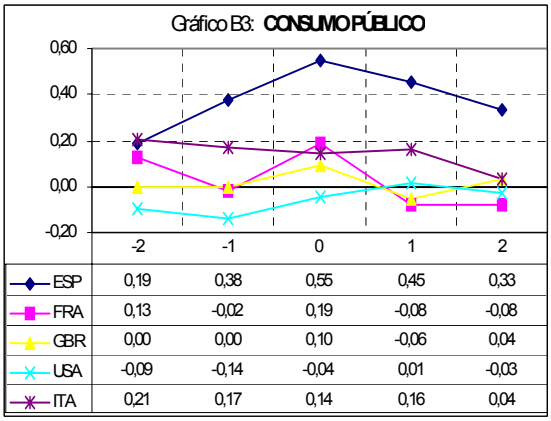
	-2	-1	0	1	2
ESP	0,60	0,73	0,80	0,73	0,63
FRA	0,32	0,44	0,61	0,31	0,37
GBR	0,08	0,17	0,35	0,22	0,16
USA	0,20	0,41	0,78	0,40	0,20
ITA	0,12	0,34	0,66	0,51	0,38

Gráfico B2: **Formación bruta de capital**



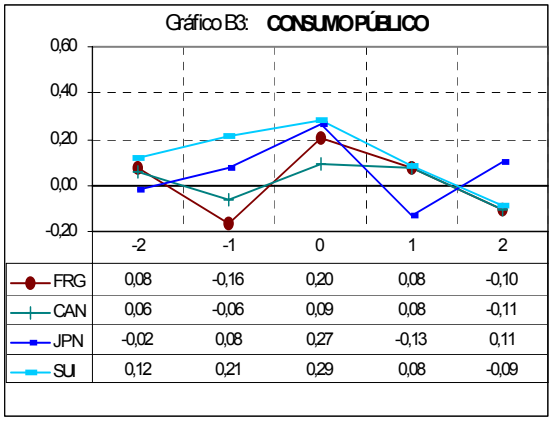
	-2	-1	0	1	2
ITA	0,12	0,34	0,66	0,51	0,38
FRG	0,36	0,23	0,75	0,27	0,16
CAN	0,19	0,37	0,48	0,36	0,12
JPN	0,21	0,06	0,81	0,24	0,22

Gráfico B3: **CONSUMO PÚBLICO**



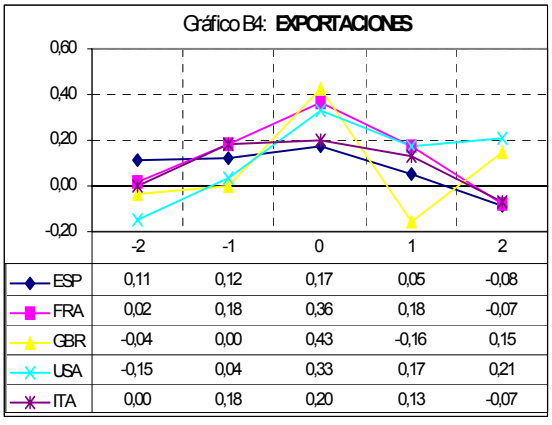
	-2	-1	0	1	2
ESP	0,19	0,38	0,55	0,45	0,33
FRA	0,13	-0,02	0,19	-0,08	-0,08
GBR	0,00	0,00	0,10	-0,06	0,04
USA	-0,09	-0,14	-0,04	0,01	-0,03
ITA	0,21	0,17	0,14	0,16	0,04

Gráfico B3: **CONSUMO PÚBLICO**



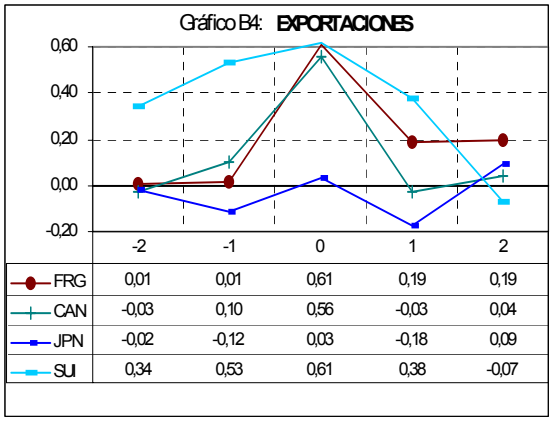
	-2	-1	0	1	2
FRG	0,08	-0,16	0,20	0,08	-0,10
CAN	0,06	-0,06	0,09	0,08	-0,11
JPN	-0,02	0,08	0,27	-0,13	0,11
SUI	0,12	0,21	0,29	0,08	-0,09

Gráfico B4: **EXPORTACIONES**



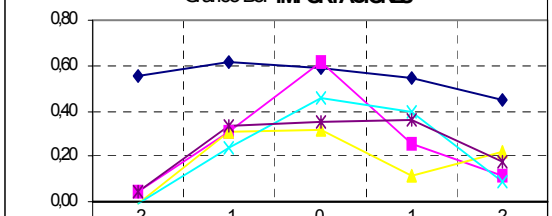
	-2	-1	0	1	2
ESP	0,11	0,12	0,17	0,05	-0,08
FRA	0,02	0,18	0,36	0,18	-0,07
GBR	-0,04	0,00	0,43	-0,16	0,15
USA	-0,15	0,04	0,33	0,17	0,21
ITA	0,00	0,18	0,20	0,13	-0,07

Gráfico B4: **EXPORTACIONES**



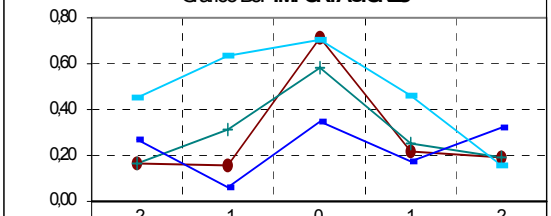
	-2	-1	0	1	2
FRG	0,01	0,01	0,61	0,19	0,19
CAN	-0,03	0,10	0,56	-0,03	0,04
JPN	-0,02	-0,12	0,03	-0,18	0,09
SUI	0,34	0,53	0,61	0,38	-0,07

Gráfico B5: **IMPORTACIONES**



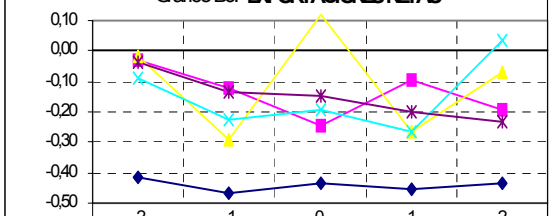
	-2	-1	0	1	2
ESP	0,55	0,62	0,59	0,55	0,45
FRA	0,04	0,30	0,62	0,26	0,11
GBR	-0,01	0,30	0,32	0,12	0,22
USA	-0,01	0,24	0,46	0,40	0,09
ITA	0,04	0,34	0,36	0,36	0,17

Gráfico B5: **IMPORTACIONES**



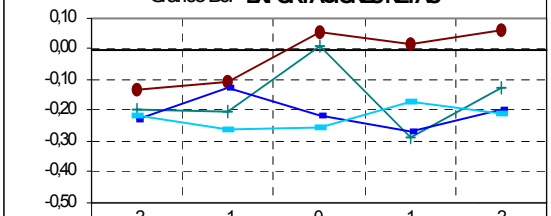
	-2	-1	0	1	2
FRG	0,17	0,16	0,72	0,22	0,19
CAN	0,17	0,32	0,58	0,25	0,19
JPN	0,27	0,06	0,35	0,18	0,32
SUI	0,45	0,64	0,70	0,46	0,15

Gráfico B6: **EXPORTACIONES NETAS**



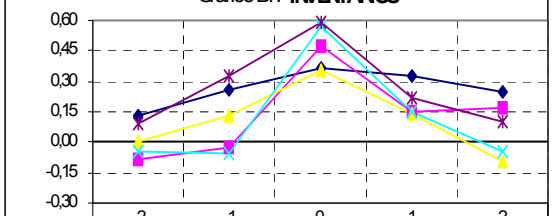
	-2	-1	0	1	2
ESP	-0,41	-0,47	-0,44	-0,45	-0,44
FRA	-0,03	-0,12	-0,25	-0,09	-0,19
GBR	-0,02	-0,29	0,12	-0,26	-0,07
USA	-0,09	-0,23	-0,19	-0,26	0,04
ITA	-0,04	-0,14	-0,15	-0,20	-0,23

Gráfico B6: **EXPORTACIONES NETAS**



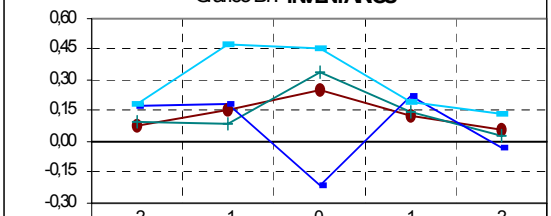
	-2	-1	0	1	2
FRG	-0,13	-0,10	0,06	0,02	0,06
CAN	-0,20	-0,20	0,01	-0,29	-0,13
JPN	-0,23	-0,12	-0,22	-0,27	-0,20
SUI	-0,22	-0,26	-0,25	-0,17	-0,21

Gráfico B7: **INVENTARIOS**



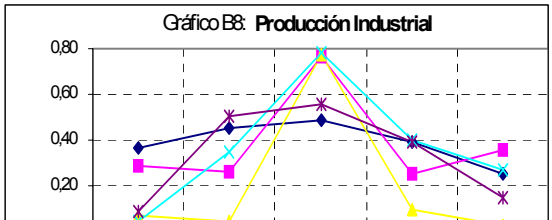
	-2	-1	0	1	2
ESP	0,13	0,26	0,37	0,32	0,24
FRA	-0,08	-0,02	0,48	0,15	0,17
GBR	0,00	0,13	0,36	0,14	-0,10
USA	-0,04	-0,06	0,57	0,15	-0,04
ITA	0,09	0,32	0,59	0,22	0,10

Gráfico B7: **INVENTARIOS**



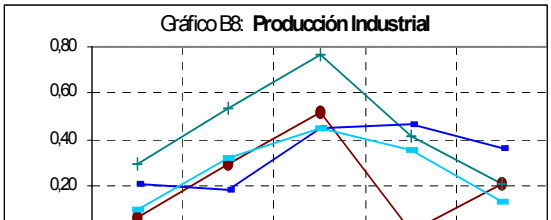
	-2	-1	0	1	2
FRG	0,08	0,15	0,25	0,13	0,06
CAN	0,10	0,09	0,34	0,14	0,03
JPN	0,17	0,18	-0,22	0,22	-0,03
SUI	0,18	0,47	0,46	0,19	0,14

Gráfico B8: **Producción Industrial**



	-2	-1	0	1	2
ESP	0,37	0,46	0,49	0,39	0,25
FRA	0,29	0,26	0,76	0,25	0,35
GBR	0,07	0,05	0,78	0,09	0,02
USA	0,04	0,35	0,78	0,40	0,27
ITA	0,09	0,51	0,55	0,39	0,15

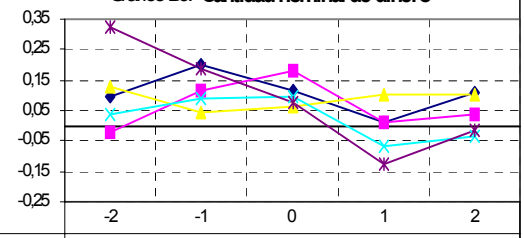
Gráfico B8: **Producción Industrial**



	-2	-1	0	1	2
FRG	0,06	0,29	0,52	0,00	0,20
CAN	0,30	0,54	0,76	0,41	0,21
JPN	0,21	0,18	0,45	0,47	0,36
SUI	0,09	0,32	0,45	0,35	0,13

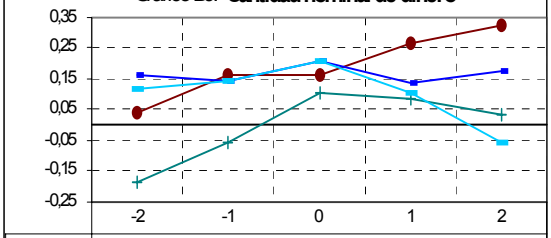
Nominal Variables ((1-L) filter).

Gráfico B9: **Cantidad nominal de dinero**



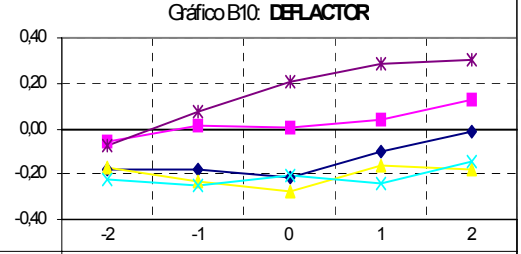
	-2	-1	0	1	2
ESP	0,10	0,20	0,11	0,01	0,11
FRA	-0,02	0,12	0,18	0,01	0,04
GBR	0,13	0,04	0,07	0,10	0,10
USA	0,04	0,09	0,10	-0,07	-0,03
ITA	0,32	0,19	0,08	-0,13	-0,01

Gráfico B9: **Cantidad nominal de dinero**



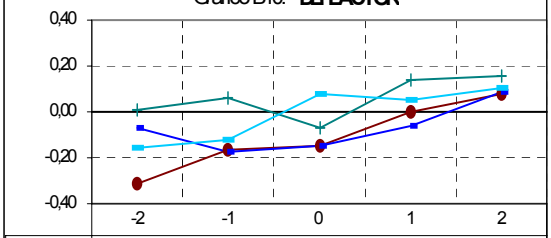
	-2	-1	0	1	2
FRG	0,04	0,16	0,16	0,27	0,32
CAN	-0,19	-0,06	0,10	0,09	0,04
JPN	0,16	0,15	0,21	0,14	0,17
SUI	0,12	0,15	0,21	0,10	-0,06

Gráfico B10: **DEFLACTOR**



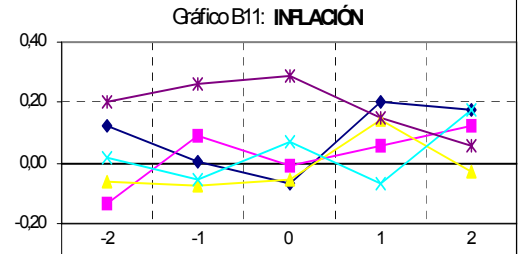
	-2	-1	0	1	2
ESP	-0,18	-0,18	-0,22	-0,10	-0,01
FRA	-0,06	0,01	0,01	0,04	0,13
GBR	-0,17	-0,24	-0,28	-0,16	-0,18
USA	-0,23	-0,25	-0,21	-0,24	-0,14
ITA	-0,07	0,07	0,20	0,29	0,30

Gráfico B10: **DEFLACTOR**



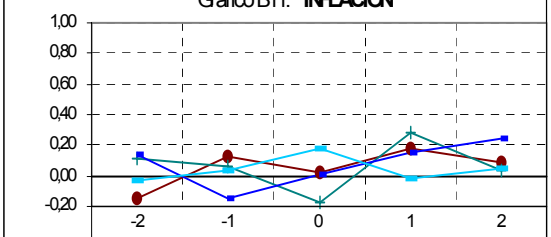
	-2	-1	0	1	2
FRG	-0,31	-0,17	-0,15	0,00	0,08
CAN	0,01	0,06	-0,07	0,14	0,16
JPN	-0,07	-0,17	-0,15	-0,06	0,09
SUI	-0,15	-0,12	0,08	0,05	0,10

Gráfico B11: **INFLACIÓN**



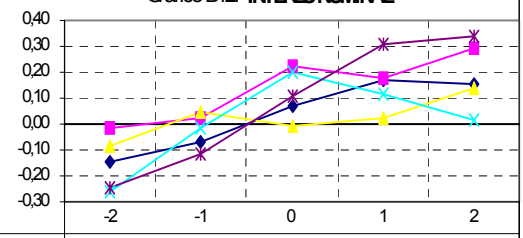
	-2	-1	0	1	2
ESP	0,12	0,00	-0,07	0,20	0,18
FRA	-0,13	0,09	-0,01	0,06	0,13
GBR	-0,06	-0,08	-0,06	0,14	-0,03
USA	0,02	-0,05	0,07	-0,07	0,18
ITA	0,20	0,26	0,29	0,15	0,06

Gráfico B11: **INFLACIÓN**



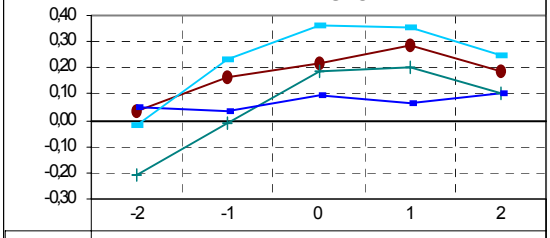
	-2	-1	0	1	2
FRG	-0,15	0,12	0,02	0,18	0,09
CAN	0,11	0,06	-0,17	0,29	0,04
JPN	0,15	-0,14	0,01	0,15	0,25
SUI	-0,02	0,03	0,18	-0,02	0,05

Gráfico B12: **INTERÉS NOMINAL**



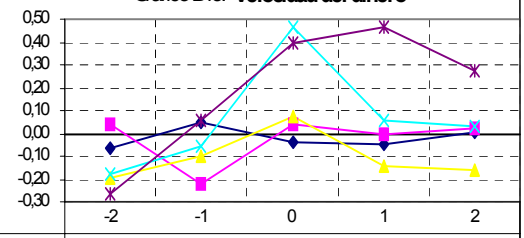
	-2	-1	0	1	2
ESP	-0,14	-0,07	0,07	0,17	0,15
FRA	-0,02	0,02	0,22	0,18	0,30
GBR	-0,09	0,04	-0,01	0,02	0,14
USA	-0,26	-0,02	0,20	0,12	0,01
ITA	-0,24	-0,12	0,11	0,31	0,34

Gráfico B12: **INTERÉS NOMINAL**



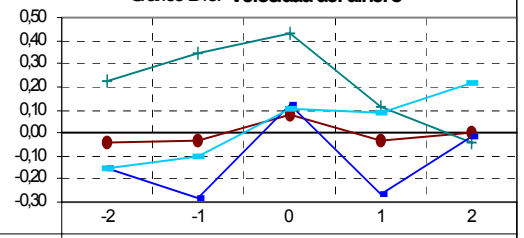
	-2	-1	0	1	2
FRG	0,04	0,17	0,22	0,28	0,19
CAN	-0,20	-0,01	0,18	0,20	0,10
JPN	0,05	0,03	0,09	0,07	0,10
SUI	-0,02	0,23	0,36	0,36	0,25

Gráfico B13: **Velocidad del dinero**



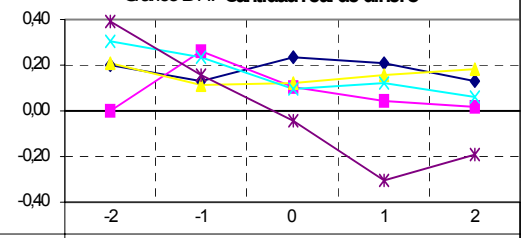
	-2	-1	0	1	2
ESP	-0,07	0,04	-0,04	-0,05	0,01
FRA	0,04	-0,22	0,04	-0,01	0,03
GBR	-0,19	-0,10	0,07	-0,15	-0,16
USA	-0,18	-0,06	0,47	0,05	0,03
ITA	-0,26	0,05	0,39	0,47	0,28

Gráfico B13: **Velocidad del dinero**



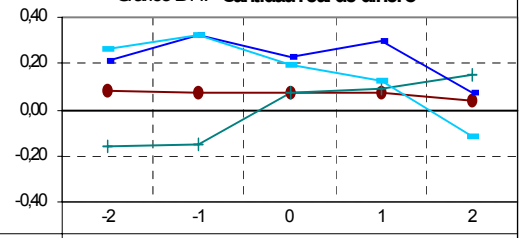
	-2	-1	0	1	2
FRG	-0,04	-0,03	0,08	-0,03	0,00
CAN	0,23	0,34	0,43	0,12	-0,04
JPN	-0,15	-0,29	0,12	-0,26	-0,02
SUI	-0,16	-0,10	0,10	0,09	0,22

Gráfico B14: **Cantidad real de dinero**



	-2	-1	0	1	2
ESP	0,20	0,13	0,24	0,21	0,13
FRA	0,00	0,26	0,10	0,04	0,01
GBR	0,21	0,11	0,13	0,15	0,19
USA	0,30	0,24	0,10	0,12	0,06
ITA	0,39	0,16	-0,04	-0,31	-0,20

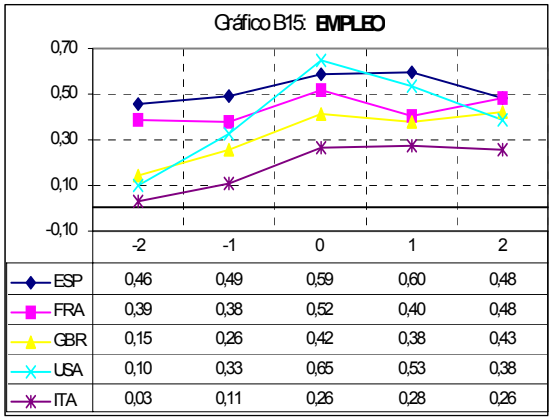
Gráfico B14: **Cantidad real de dinero**



	-2	-1	0	1	2
FRG	0,08	0,07	0,08	0,07	0,04
CAN	-0,16	-0,15	0,07	0,09	0,15
JPN	0,21	0,32	0,23	0,30	0,07
SUI	0,26	0,32	0,20	0,13	-0,11

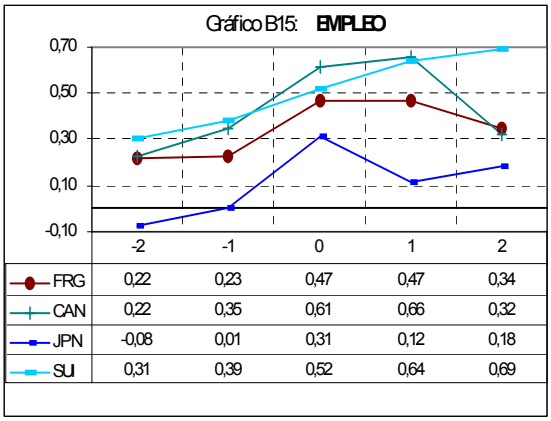
Labour market ((1-L) filter).

Gráfico B15: **EMPLEO**



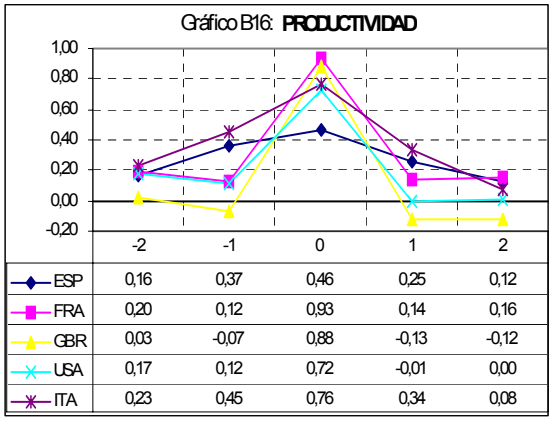
	-2	-1	0	1	2
ESP	0,46	0,49	0,59	0,60	0,48
FRA	0,39	0,38	0,52	0,40	0,48
GBR	0,15	0,26	0,42	0,38	0,43
USA	0,10	0,33	0,65	0,53	0,38
ITA	0,03	0,11	0,26	0,28	0,26

Gráfico B15: **EMPLEO**



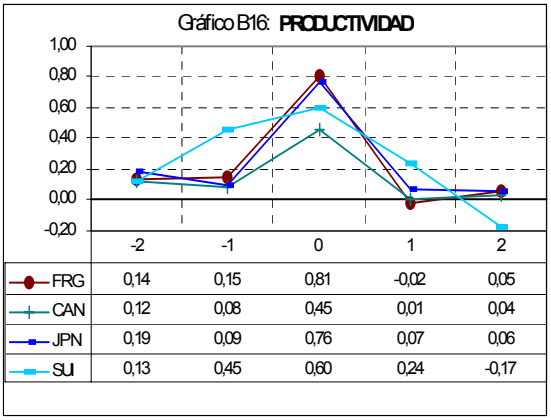
	-2	-1	0	1	2
FRG	0,22	0,23	0,47	0,47	0,34
CAN	0,22	0,35	0,61	0,66	0,32
JPN	-0,08	0,01	0,31	0,12	0,18
SUI	0,31	0,39	0,52	0,64	0,69

Gráfico B16: **PRODUCTIVIDAD**



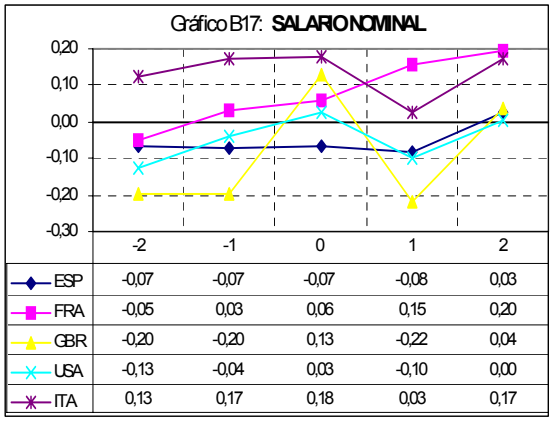
	-2	-1	0	1	2
ESP	0,16	0,37	0,46	0,25	0,12
FRA	0,20	0,12	0,93	0,14	0,16
GBR	0,03	-0,07	0,88	-0,13	-0,12
USA	0,17	0,12	0,72	-0,01	0,00
ITA	0,23	0,45	0,76	0,34	0,08

Gráfico B16: **PRODUCTIVIDAD**



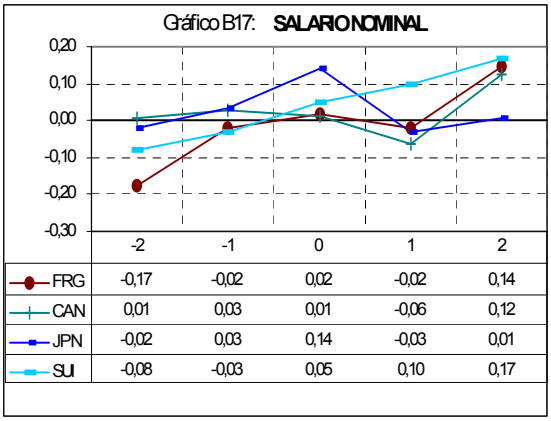
	-2	-1	0	1	2
FRG	0,14	0,15	0,81	-0,02	0,05
CAN	0,12	0,08	0,45	0,01	0,04
JPN	0,19	0,09	0,76	0,07	0,06
SUI	0,13	0,45	0,60	0,24	-0,17

Gráfico B17: **SALARIO NOMINAL**



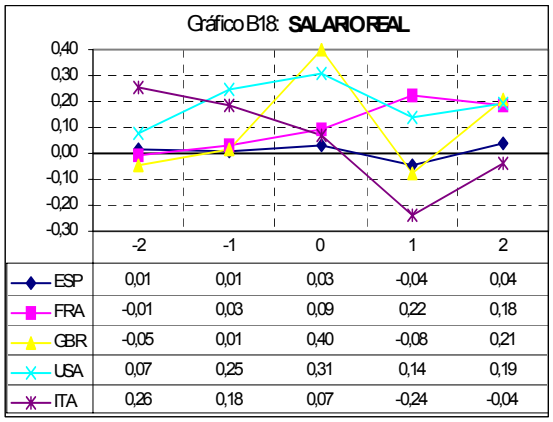
	-2	-1	0	1	2
ESP	-0,07	-0,07	-0,07	-0,08	0,03
FRA	-0,05	0,03	0,06	0,15	0,20
GBR	-0,20	-0,20	0,13	-0,22	0,04
USA	-0,13	-0,04	0,03	-0,10	0,00
ITA	0,13	0,17	0,18	0,03	0,17

Gráfico B17: **SALARIO NOMINAL**



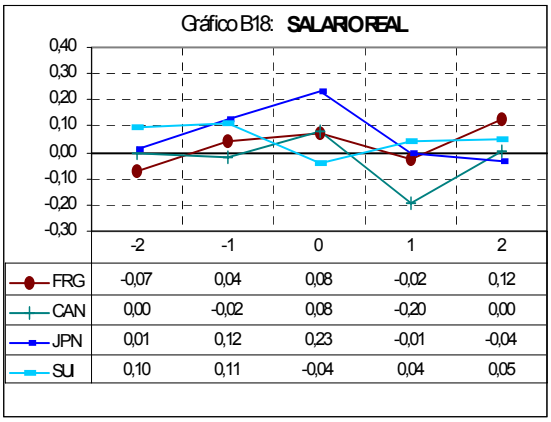
	-2	-1	0	1	2
FRG	-0,17	-0,02	0,02	-0,02	0,14
CAN	0,01	0,03	0,01	-0,06	0,12
JPN	-0,02	0,03	0,14	-0,03	0,01
SUI	-0,08	-0,03	0,05	0,10	0,17

Gráfico B18: **SALARIO REAL**



	-2	-1	0	1	2
ESP	0,01	0,01	0,03	-0,04	0,04
FRA	-0,01	0,03	0,09	0,22	0,18
GBR	-0,05	0,01	0,40	-0,08	0,21
USA	0,07	0,25	0,31	0,14	0,19
ITA	0,26	0,18	0,07	-0,24	-0,04

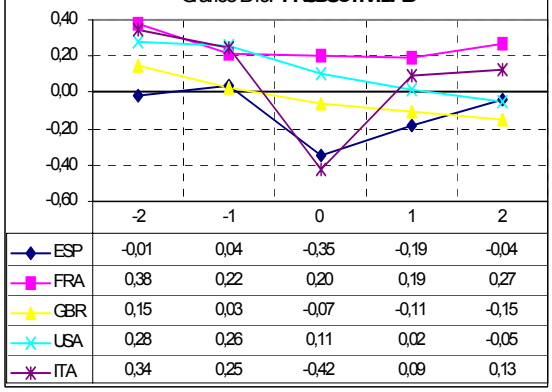
Gráfico B18: **SALARIO REAL**



	-2	-1	0	1	2
FRG	-0,07	0,04	0,08	-0,02	0,12
CAN	0,00	-0,02	0,08	-0,20	0,00
JPN	0,01	0,12	0,23	-0,01	-0,04
SUI	0,10	0,11	-0,04	0,04	0,05

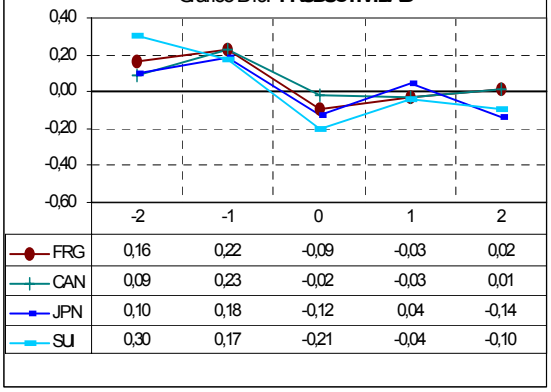
Cross-correlations with employment. ((1-L) filter).

Gráfico B19: **PRODUCTIVIDAD**



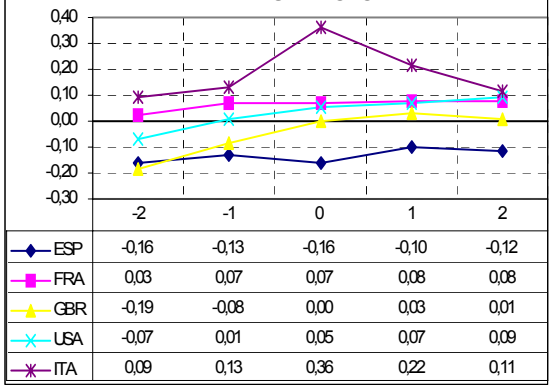
	-2	-1	0	1	2
ESP	-0,01	0,04	-0,35	-0,19	-0,04
FRA	0,38	0,22	0,20	0,19	0,27
GBR	0,15	0,03	-0,07	-0,11	-0,15
USA	0,28	0,26	0,11	0,02	-0,05
ITA	0,34	0,25	-0,42	0,09	0,13

Gráfico B19: **PRODUCTIVIDAD**



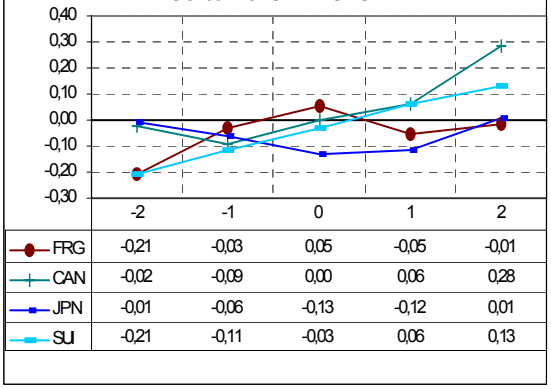
	-2	-1	0	1	2
FRG	0,16	0,22	-0,09	-0,03	0,02
CAN	0,09	0,23	-0,02	-0,03	0,01
JPN	0,10	0,18	-0,12	0,04	-0,14
SUI	0,30	0,17	-0,21	-0,04	-0,10

Gráfico B20: **SALARIO NOMINAL**



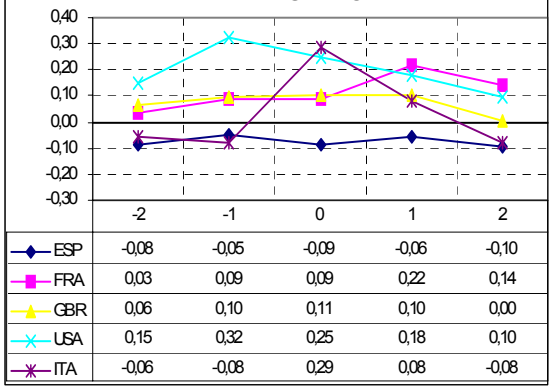
	-2	-1	0	1	2
ESP	-0,16	-0,13	-0,16	-0,10	-0,12
FRA	0,03	0,07	0,07	0,08	0,08
GBR	-0,19	-0,08	0,00	0,03	0,01
USA	-0,07	0,01	0,05	0,07	0,09
ITA	0,09	0,13	0,36	0,22	0,11

Gráfico B20: **SALARIO NOMINAL**



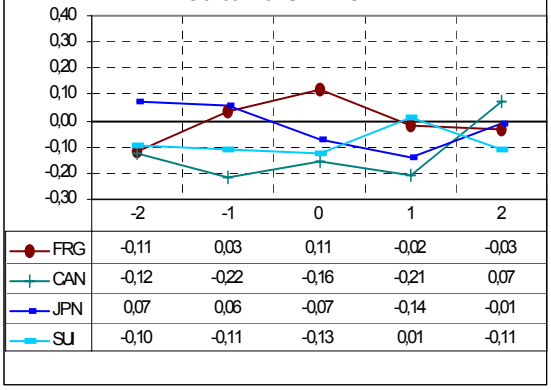
	-2	-1	0	1	2
FRG	-0,21	-0,03	0,05	-0,05	-0,01
CAN	-0,02	-0,09	0,00	0,06	0,28
JPN	-0,01	-0,06	-0,13	-0,12	0,01
SUI	-0,21	-0,11	-0,03	0,06	0,13

Gráfico B20: **SALARIO REAL**



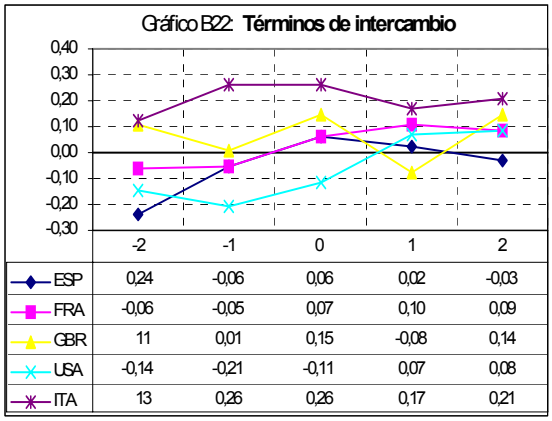
	-2	-1	0	1	2
ESP	-0,08	-0,05	-0,09	-0,06	-0,10
FRA	0,03	0,09	0,09	0,22	0,14
GBR	0,06	0,10	0,11	0,10	0,00
USA	0,15	0,32	0,25	0,18	0,10
ITA	-0,06	-0,08	0,29	0,08	-0,08

Gráfico B20: **SALARIO REAL**

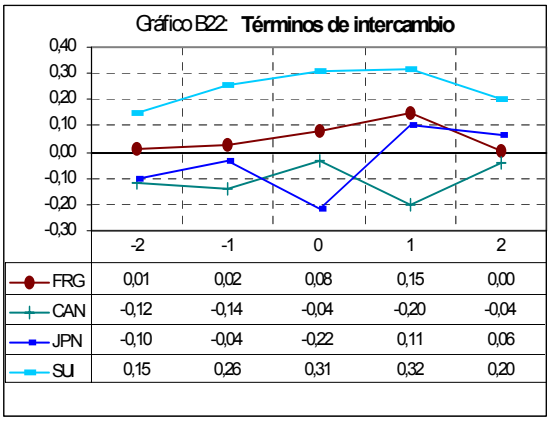


	-2	-1	0	1	2
FRG	-0,11	0,03	0,11	-0,02	-0,03
CAN	-0,12	-0,22	-0,16	-0,21	0,07
JPN	0,07	0,06	-0,07	-0,14	-0,01
SUI	-0,10	-0,11	-0,13	0,01	-0,11

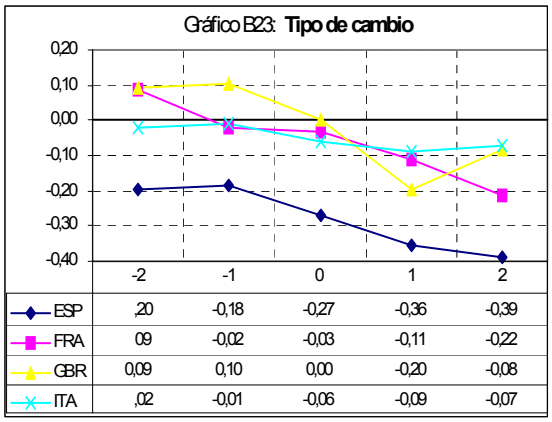
External Sector. ((1-L) filter).



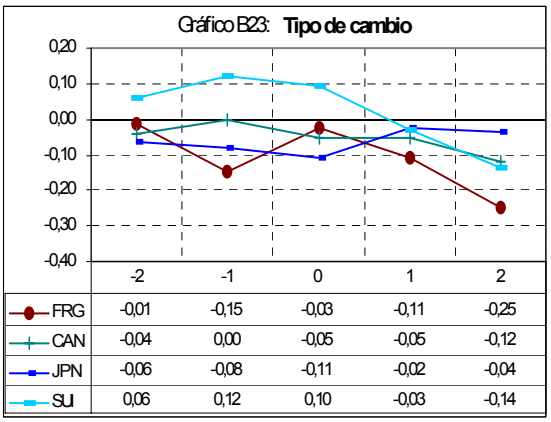
	-2	-1	0	1	2
ESP	0,24	-0,06	0,06	0,02	-0,03
FRA	-0,06	-0,05	0,07	0,10	0,09
GBR	11	0,01	0,15	-0,08	0,14
USA	-0,14	-0,21	-0,11	0,07	0,08
ITA	13	0,26	0,26	0,17	0,21



	-2	-1	0	1	2
FRG	0,01	0,02	0,08	0,15	0,00
CAN	-0,12	-0,14	-0,04	-0,20	-0,04
JPN	-0,10	-0,04	-0,22	0,11	0,06
SU	0,15	0,26	0,31	0,32	0,20



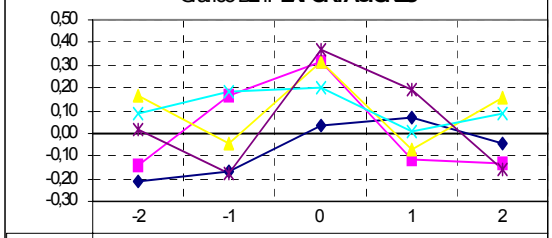
	-2	-1	0	1	2
ESP	,20	-0,18	-0,27	-0,36	-0,39
FRA	09	-0,02	-0,03	-0,11	-0,22
GBR	0,09	0,10	0,00	-0,20	-0,08
ITA	,02	-0,01	-0,06	-0,09	-0,07



	-2	-1	0	1	2
FRG	-0,01	-0,15	-0,03	-0,11	-0,25
CAN	-0,04	0,00	-0,05	-0,05	-0,12
JPN	-0,06	-0,08	-0,11	-0,02	-0,04
SU	0,06	0,12	0,10	-0,03	-0,14

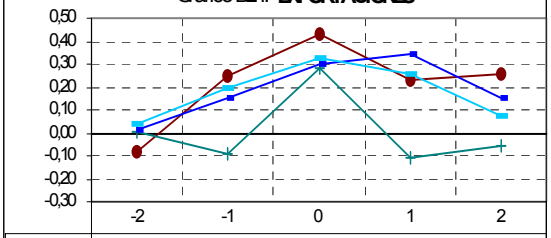
Cross-correlations with the terms of trade. ((1-L) filter).

Gráfico B24: **EXPORTACIONES**



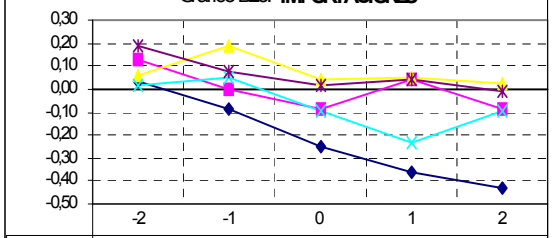
	-2	-1	0	1	2
ESP	-0,22	-0,17	0,03	0,07	-0,05
FRA	-0,14	0,16	0,31	-0,11	-0,14
GBR	0,17	-0,05	0,32	-0,07	0,16
USA	0,09	0,18	0,20	0,00	0,08
ITA	0,02	-0,18	0,36	0,19	-0,16

Gráfico B24: **EXPORTACIONES**



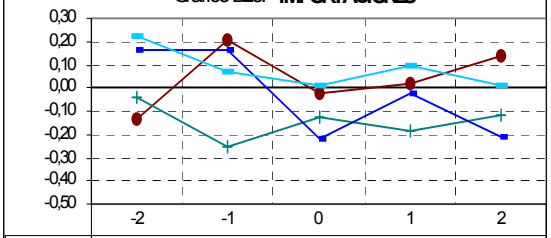
	-2	-1	0	1	2
FRG	-0,08	0,25	0,43	0,23	0,26
CAN	0,00	-0,09	0,28	-0,10	-0,06
JPN	0,01	0,16	0,30	0,34	0,15
SUI	0,04	0,19	0,32	0,26	0,08

Gráfico B25: **IMPORTACIONES**



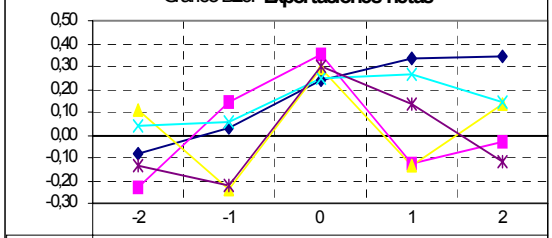
	-2	-1	0	1	2
ESP	0,04	-0,09	-0,25	-0,37	-0,43
FRA	0,13	0,00	-0,08	0,04	-0,08
GBR	0,06	0,19	0,04	0,05	0,03
USA	0,02	0,05	-0,10	-0,24	-0,09
ITA	0,19	0,08	0,02	0,04	-0,01

Gráfico B25: **IMPORTACIONES**



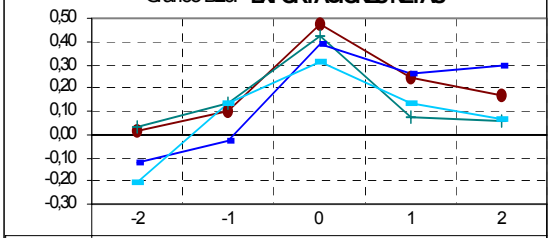
	-2	-1	0	1	2
FRG	-0,13	0,20	-0,03	0,02	0,14
CAN	-0,04	-0,25	-0,13	-0,19	-0,12
JPN	0,17	0,16	-0,22	-0,02	-0,21
SUI	0,22	0,07	0,01	0,09	0,01

Gráfico B26: **Exportaciones netas**



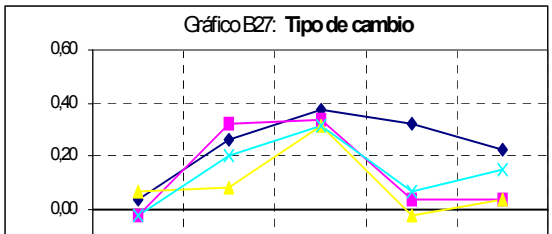
	-2	-1	0	1	2
ESP	-0,09	0,03	0,24	0,33	0,34
FRA	-0,23	0,15	0,35	-0,13	-0,03
GBR	0,11	-0,24	0,29	-0,13	0,14
USA	0,04	0,06	0,25	0,27	0,14
ITA	-0,13	-0,22	0,30	0,14	-0,12

Gráfico B26: **EXPORTACIONES NETAS**



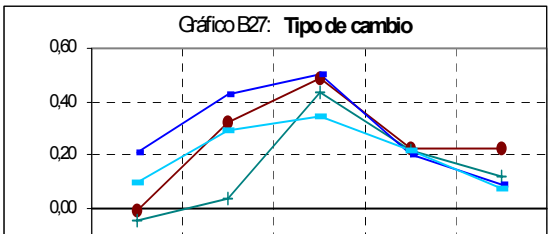
	-2	-1	0	1	2
FRG	0,01	0,10	0,47	0,24	0,17
CAN	0,03	0,13	0,43	0,07	0,06
JPN	-0,12	-0,02	0,39	0,26	0,29
SUI	-0,21	0,13	0,32	0,13	0,07

Gráfico B27: **Tipo de cambio**



	-2	-1	0	1	2
ESP	0,03	0,26	0,37	0,32	0,22
FRA	-0,03	0,32	0,33	0,04	0,04
GBR	0,06	0,08	0,31	-0,03	0,03
ITA	-0,03	0,20	0,31	0,06	0,15

Gráfico B27: **Tipo de cambio**



	-2	-1	0	1	2
FRG	-0,01	0,32	0,49	0,22	0,22
CAN	-0,05	0,04	0,43	0,22	0,11
JPN	0,21	0,42	0,50	0,20	0,09
SUI	0,10	0,29	0,34	0,21	0,07

Gráfico B32: **Correlaciones máximas con el PIB (filtro (1-L))**

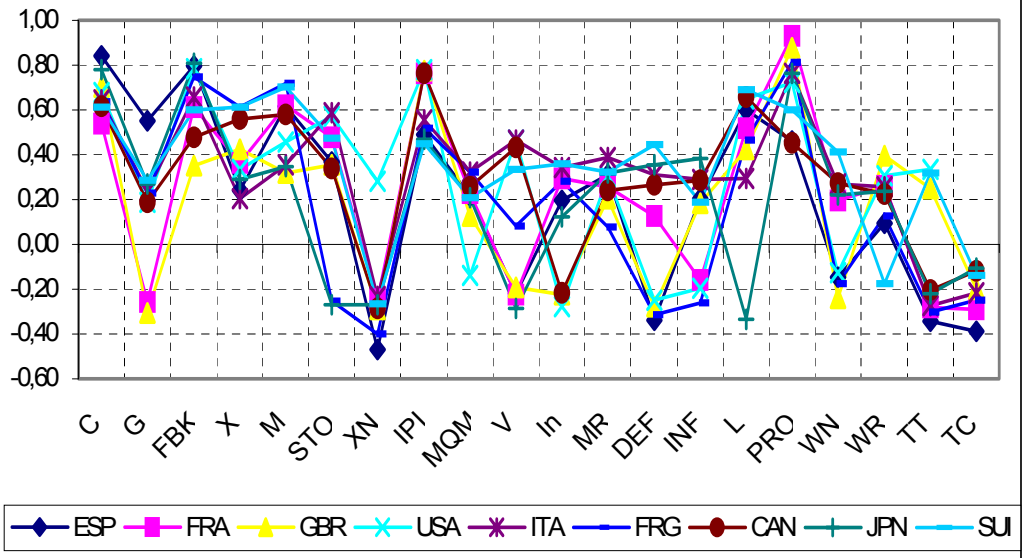


Gráfico B33: **Corr. contemporaneas con el PIB (filtro (1-L))**

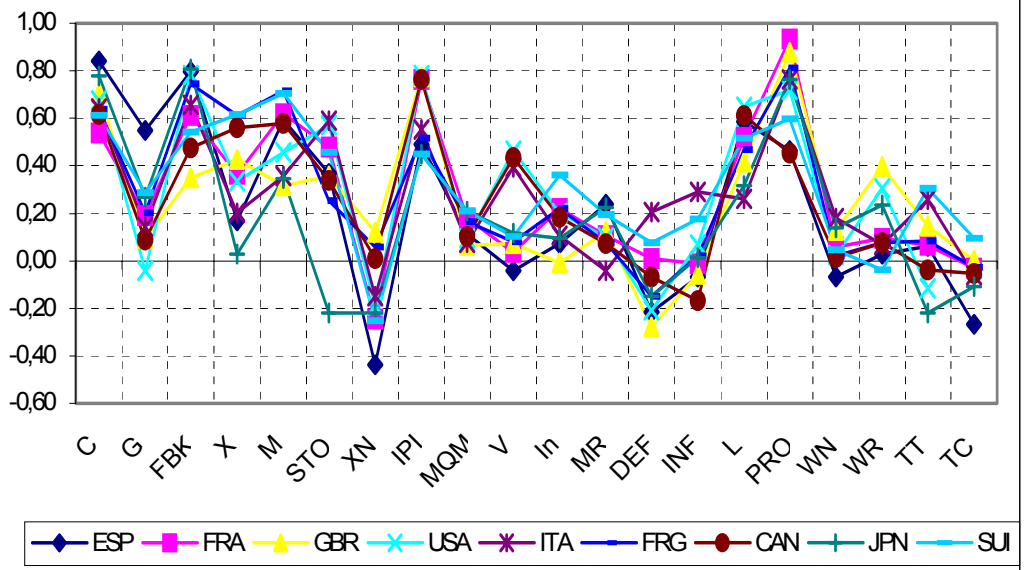


Gráfico B34: **Variabilidad absoluta (filtro (1-L))**

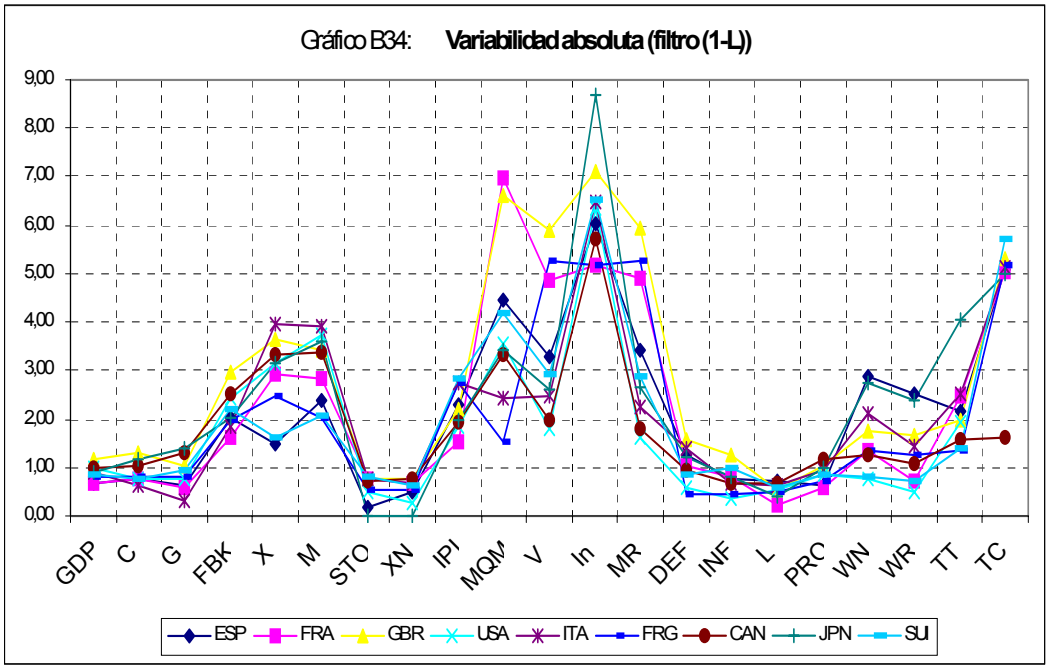
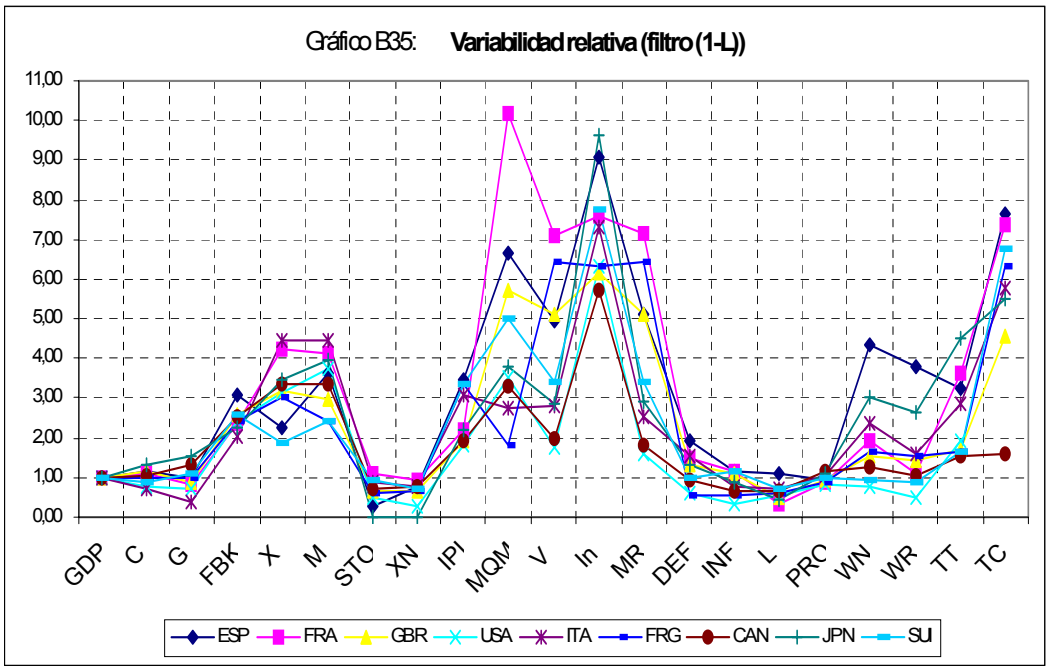


Gráfico B35: **Variabilidad relativa (filtro (1-L))**



Relative volatilities to GDP ((1-L) filter).*

REAL VARIABLES									
	ESP	FRA	GRB	USA	ITA	FRG	CAN	JPN	SUI
PIB	0.66	0.68	1.16	1.00	0.89	0.82	1.00	0.90	0.84
C	1.13	1.08	1.14	0.78	0.72	0.96	1.04	1.30	0.90
G	0.98	0.83	0.88	0.74	0.37	0.97	1.29	1.53	1.10
FBK	3.07	2.35	2.58	2.41	2.06	2.39	2.51	2.25	2.60
X	2.25	4.24	3.16	3.13	4.47	3.02	3.34	3.49	1.89
M	3.61	4.14	2.95	3.74	4.43	2.44	3.37	3.97	2.43
STO	0.25	1.11	0.65	0.50	0.88	0.63	0.71	0.54	0.96
XN	0.76	0.95	0.65	0.27	0.74	0.67	0.75	0.40	0.72
IPI	3.47	2.20	1.91	1.83	3.07	3.34	1.93	2.21	3.34
MONETARY VARIABLES									
	ESP	FRA	GRB	USA	ITA	FRG	CAN	JPN	SUI
MQM	6.67	10.17	5.71	3.53	2.74	1.83	3.32	3.78	4.97
MR	5.12	7.14	5.13	1.59	2.55	6.42	1.81	2.93	3.42
V	4.92	7.11	5.10	1.78	2.80	6.42	2.00	2.88	3.43
IN	9.09	7.56	6.14	6.31	7.31	6.31	5.73	9.60	7.74
DEF	1.90	1.48	1.34	0.60	1.55	0.57	0.94	1.33	1.01
INF	1.14	1.15	1.10	0.33	0.77	0.52	0.68	0.89	1.14
LABOUR MARKET									
	ESP	FRA	GRB	USA	ITA	FRG	CAN	JPN	SUI
L	1.07	0.33	0.47	0.52	0.71	0.57	0.66	0.44	0.71
PRO	0.91	0.88	0.91	0.85	1.06	0.90	1.17	1.10	0.99
Wn	4.34	1.95	1.51	0.77	2.38	1.66	1.25	3.03	0.93
WR	3.80	1.08	1.43	0.47	1.61	1.52	1.07	2.64	0.85
EXTERNAL SECTOR									
	ESP	FRA	GRB	USA	ITA	FRG	CAN	JPN	SUI
TT	3.23	3.60	1.72	1.93	2.84	1.65	1.56	4.51	1.62
TC	7.63	7.38	4.57	--	5.75	6.30	1.61	5.51	6.77

* (1-L) filter (1970:2-1993:4). The variability for GDP's is absolute (in percentage); for the other variables are relatives to the GDP´s volatility.

References:

Artis, M. J. y Zhang, W. (1995): "International business cycles and the ERM: Is there a European business cycle?" European University Institute. W.P ECO 95/34.

Aiyagari, S. R.; Christiano, L. J. y Eichenbaum, M. (1990): "The output, employment, and interest rate effects of governement consumption". NBER Working Paper 3330.

Backus, D. K. y Kehoe, P. J. (1992): "International evidence on the historical properties of business cycles". American Economic Review, 82, pp. 864-888.

Backus, D. K.; Kehoe, P.J. y Kydland, F. E. (1993): "International business cycles: Theory and evidence" en Thomas F. Cooley (ed.), *Frontiers of Business Cycle Research*. Princeton University Press.

Baxter, M. y King, R.G. (1995): "Measuring business cycles: Approximate band-pass filters for economic time series". NBER Working Paper, nº 5022.

Blackburn, K. y Ravn, M.O. (1992): "Business cycles in the United Kingdom : Facts and fictions". Economica, 59, pp. 383-401.

Brandner, P. y Neusser, K. (1992): "Business cycles in open economies: Stylized facts for Austria and Germany". Weltwirtschaftliches Archiv, 128, pp. 67-87.

Burns, A. M. y Mitchell, W. C. (1946): *Measuring Business Cycles*. New York: National Bureau of Economic Research.

Burnside, G. (1998): "Detrending and business cycle facts: A comment". Journal of Monetary Economics, 41, pp 513-532.

Canova, F. (1998): "Detrending and business cycle facts". Journal of Monetary Economics, 41, pp 475-512.

Canova, F. (1998): "Detrending and business cycle facts: A user's guide". Journal of Monetary Economics, 41, pp 533-540.

Christiano, L. J. y Eichenbaum, M. (1990): "Is theory really ahead of measurement? Current real business cycle theories and aggregate labor market fluctuations". NBER Working Paper 2700.

Christodoulakis, N.; Dimelis, S. P. y Kollintzas, T. (1995) : "Comparisons of business cycles in the EC : Idiosyncracies and regularities". Economica, 62 , pp 1-27.

Cogley, T. y Nason, J.M. (1995): "Effects of the HP filter on integrated series". Journal of Economics Dynamics and Control, 19, pp.253-278.

Cogley, T. (1997): "Evaluating non-structural measures of the business cycles". Federal Reserve Bank of San Francisco, Economic Review, Nº 3.

Cooley, T.F. y Ohanian, L.E. (1991): "The cyclical behavoir of prices". Journal of Monetary Economics, 28, pp. 25-60.

Danthine, J.P. y Girardin, M. (1989): "Business cycles in Switzerland (a comparative study)". European Economic Review, 33, pp 31-50.

Danthine, J.P. y Donaldson, J.B. (1993): "Methodological and empirical issues in real business cycle theory". European Economic Review, 37, pp 1-35.

Dimelis, S. P. (1997): "Cyclical and causal relations between real wages and employment in the EU". Applied Economics, 29, pp 311-324.

Dolado, J.J ; Sebastián, M. y Vallés, J. (1993) : "Cyclical patterns of theSpanish economy". Invetigaciones Económicas, Vol XVII(3), pp 445-473.

Dunlop, J. T. (1938): "The movement of real and money wage rates". Economic Journal, 48, pp. 413-434.

Englund, P.; Persson, T. y Svensson, E.O. (1992) : "Swedish business cycles : 1861-1988". Journal of Monetary Economics, 30, pp 343-371.

Estrada, A. y Sebastian, M. (1993): "Una serie de gasto en bienes de consumo duradero". DT 9305, Banco de España.

Fiorito, F. y Kollintzas, T. (1994): "Stylized facts of business cycles in the G7 from a real business cycles perspective". European Economic Review 38, pp. 235-269.

Hassler, J.; Lundvik, P.; Persson, T. y Söderlind, P. (1994): "The Swedish Business Cycle: Stylized facts over 130 years" in Measuring and Interpreting Business Cycles. Clarendon Press. Oxford.

Hodrick, R. y Prescott, E.C. (1980): "Postwar U.S. business cycles: An empirical investigation". Carnegie-Mellon University. Mimeo.

Hodrick, R. y Prescott, E.C. (1997): "Postwar U.S. business cycles: An empirical investigation". Journal of Money, Credit, and Banking, 29, pp. 1-16.

Judd, J.P. y Trehan, B. (1995): "The cyclical behavoir of prices: Interpreting the evidence". Journal of Money, Credit, and Banking, 27, Nº 3, pp. 789-797.

King, R. G.; Plosser, C. I.; Stock, J. H., y Watson, M. W. (1991): " Stochastics trends and economics fluctuations". American Economic Review, 81, pp. 819-840.

King, R. G.; y Watson, M. W. (1996): "Money, prices, interest rates and the business cycle". The Review of Economics and Statistics, pp.35-53.

Kydland, F. E. y Prescott, E. C. (1989): "Cyclical movements of the labour input and its implicit real wage". Research Department W. P. 413, Federal Reserve Bank of Minneapolis.

Kydland, F. E. y Prescott, E. C. (1990): "Business cycles: real facts and monetary myth". Federal Reserve Bank of Minneapolis Quarterly Review 14(2), pp. 3-18.

Lucas, R. E. (1977): “Understanding business cycles”. Carnegie-Rochester Conference Series on Public Policy, 5, pp. 7-29.

Nelson, C.R y Plosser, C. I. (1982): “Trends and random walks in macroeconomics time series”. Journal of Monetary Economics, 10, pp 139-162.

Nickell, S. y Symons, J. (1990): “The real wage employment relationship in the United Stated”. Journal of Labor Economics, 86, pp. 281-291.

Tharsis, L. (1939): “Changes in real and money wages”. Economic Journal, 49, pp.150-154.